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# MODERN METALS

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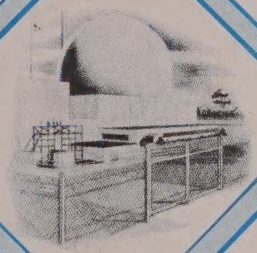

## CHAIN LINK FENCES:

## A fast-breaking market for

## 50 million pounds of aluminum rod

## wire castings extrusions in 1961.

(page 28)

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UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

# Reynolds Aluminum HOLOBAR™

## saves 2 to 10 minutes machining time per part

Reynolds Holobar machines quickly to close tolerances. Hydromatics, Inc., saves two to ten minutes machining time per part.

see next page for details

# Reynolds Aluminum HOLOBAR™

**Hydromatics, Inc., in Livingston, New Jersey, uses Reynolds Aluminum Holobar for this important reason:**

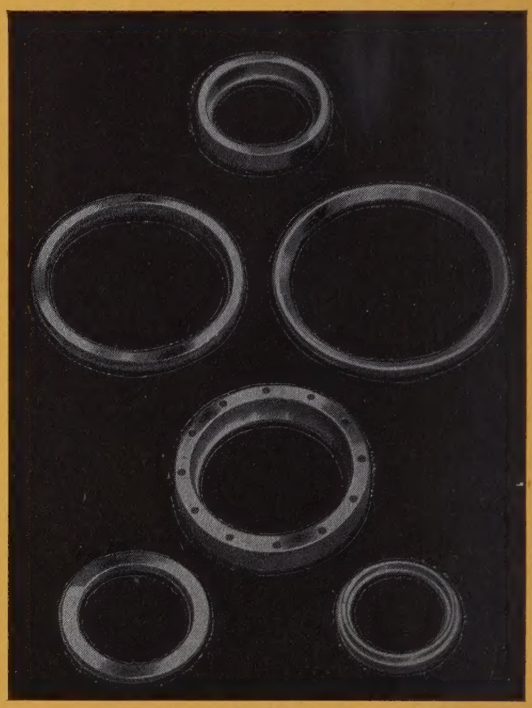
**Holobar is aluminum bar stock—minus the core! Seamless mechanical tubing that saves reaming and boring time—a two to ten minute saving per part, depending on the part, for Hydromatics—and scrap is reduced, tool life is increased.**

Hydromatics makes ball valves for both military and industrial use. Reynolds Aluminum Holobar is used for seat rings, spacer sleeves, seat retainers, and cups in these valves. Withstanding the chemical action of fuels and other fluids, Holobar retains its mechanical properties despite pressure and temperature extremes. And, as aluminum actually gains strength as temperature decreases, Holobar is perfect for use in cryogenic applications.

Since much machining is eliminated, tool wear is reduced, and closer tolerances can be held, as heat and pressure generated in machining solid bar stock are reduced. Holobar also features uniform physical properties and wall-to-wall mechanical soundness. It has no core-to-surface variation often common in solid stock after machining.

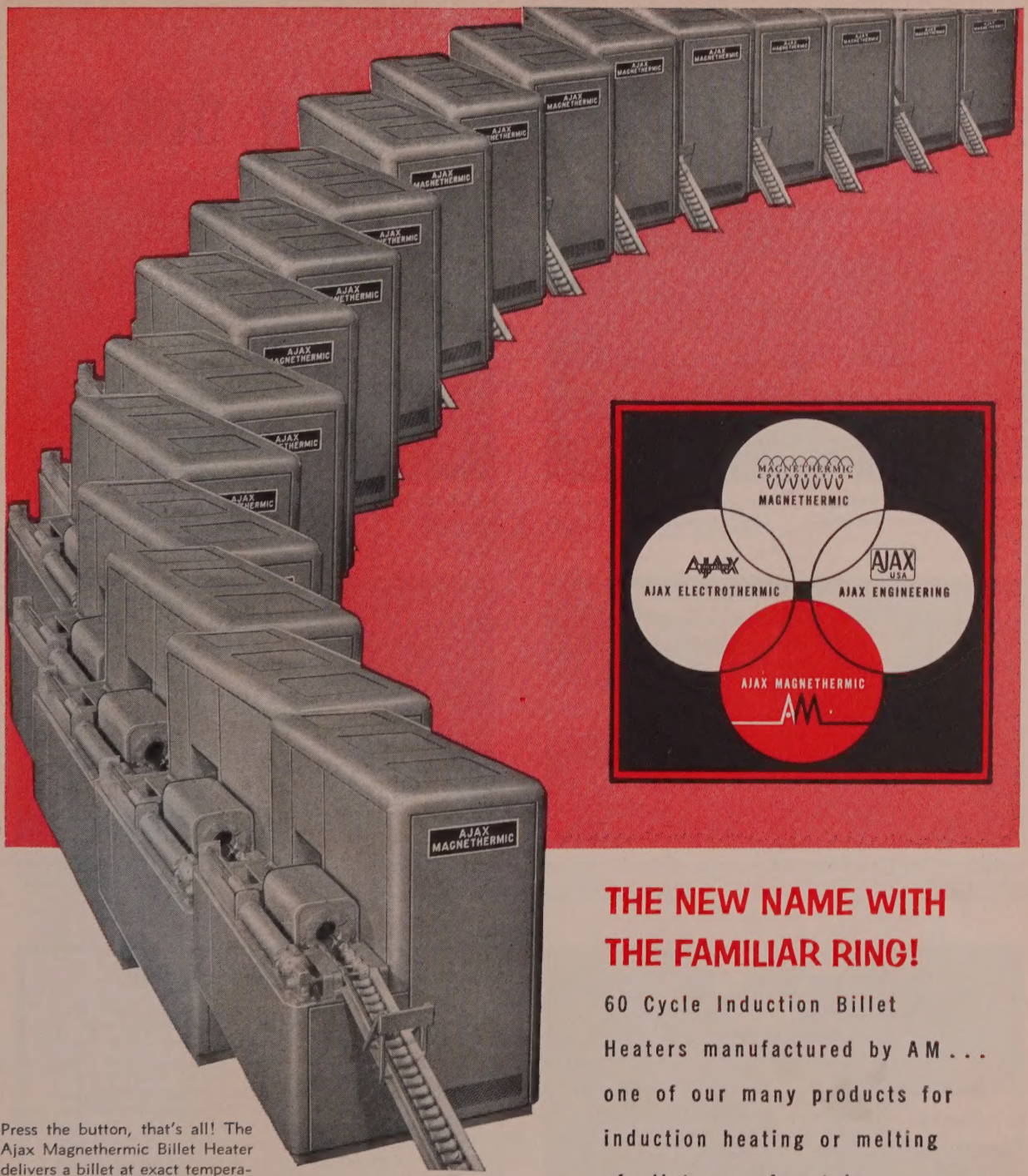
Lower in cost than bar stock, Reynolds Aluminum Holobar can save in many other ways: Holobar stock weighs less—is easier to handle and move. Scrap problems are reduced, and initial drilling costs are eliminated; boring costs are reduced. Available in alloys 2024, 6061 and 7075, sizes range from one inch to eight inches O.D. All alloys are not available in all sizes.

Reynolds Holobar is one of many ways in which Reynolds Aluminum serves industry with metal—and know-how. For full details on Holobar, or on any aluminum product, contact your Reynolds Distributor or write direct to *Reynolds Metals Company, P.O. Box 2346-GM, Richmond 18, Virginia.*



Hydromatics, Inc., makes valve seat rings, spacer sleeves, seat retainers, and cups from Reynolds Aluminum Holobar.

Watch Reynolds new TV show "Harrigan & Son", Fridays; also "All Star Golf", Saturdays—ABC-TV.

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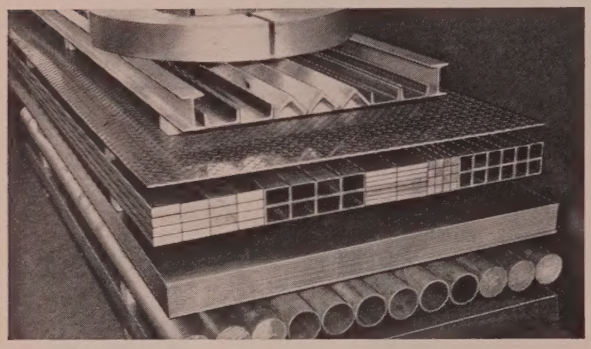
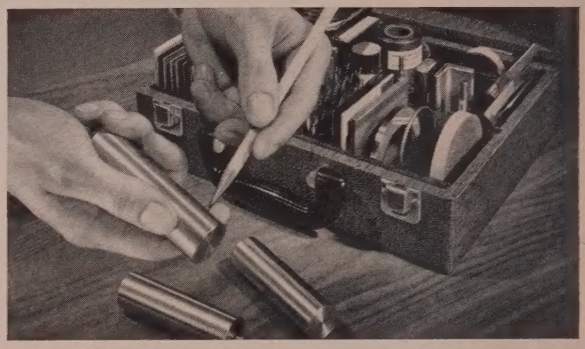
# 5 WAYS TO . . .

# stretch aluminum-buying dollars

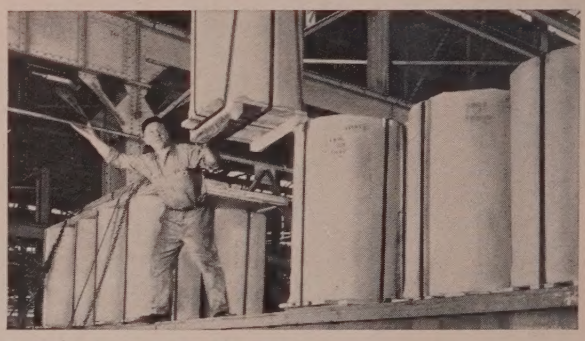


**WIDEST SELECTION**—At Ryerson you choose from the nation's largest stocks—available to meet your every need, large or small.



**HELP IN SELECTION**—Your Ryerson representative is Metalogics-trained to help you choose the best aluminum alloy for each application . . . and to assist you with fabrication problems.

**FIRST WITH THE NEWEST**—Ryerson is consistently first with the newest developments. For example, new low-cost building sheet that is helping customers save on many fabricated parts.



**DEPENDABLE DELIVERY**—Finest care in handling and packaging. Production-line-timed shipments assure fastest service. Any quantity—when you need it.

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MODERN METALS
Read in companies that produce, fabricate and cast aluminum, magnesium and titanium, and firms that use these metals in manufacturing end products.

**ON THE COVER:** The next big home improvement market for aluminum fabricators is fencing, and some chain link fence manufacturers are confident that they have the product that can do the job. On the strength of the developing residential and highway markets, one aluminum chain link producer forecasts consumption of 25,000 tons of aluminum by the industry next year. More than half this amount will be in extrusions, pipe and castings. By 1965, chain link fence jobs may be using 130,000 tons of aluminum. The story starts on page 28.

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**PUBLISHER** W. B. GRIFFIN

# Modern Metals

**VOLUME XVI** **DECEMBER, 1960** **NUMBER 11**

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New machine is said to cut manhours, speed production, improve finish, and reduce scrap in extrusion plants.

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**WEBCOR USES A COMPLETE EXTRUSION SERVICE** ..... H. K. Darby **52**
Electronic recording devices made by Webcor incorporate extruded parts that are fabricated and finished by a well-equipped custom extruder. These parts, and recorder assembly are covered.

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First National Die Casting Exposition and Congress, held recently in Detroit, highlighted 80 exhibits, presentation of achievement award, and technical papers on the following topics:

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A light weight trailer fabricated of tubular aluminum helps car dealers reduce shipping costs by 10%.

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**COMPLETE WAREHOUSE STOCKS**

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Give age, family, experience, references, salary requirement. Enclose photograph.

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**Chicago 11, Illinois**



puzzled ?

***about cleaning or finishing aluminum***

Get a copy of ***"How to Clean and Finish Aluminum"***

Use order form on page 53.


# Letters

## Wants Data on Impact Extrusion

Sirs:

We would appreciate any information you might be able to furnish us on the aluminum impact extrusion industry.

We have contacted your advertisers for information on impact extrusion presses. However, we are interested in securing, for our executive library, any related information you might be able to furnish us.

"W" — Georgia

**MM — We have sent you tear sheets or reprints of impact extrusion articles published by Modern Metals. There has been a surprising revival of interest in this process, so we plan to publish a general article on the subject soon.**

## MIG — Spot Welding Aluminum

Sirs:

We would like more information on the article, "Aluminum can now be MIG spot welded," in your October issue.

First we would like to express our position. We are in the welding and fabricating business. We do TIG, MIG, arc welding, spot welding, brazing and fabrication in a broad field.

In regard to metallurgical laboratories of Olin Mathieson Chemical Corp. of New Haven:

1. Can more information be obtained from this company?
2. Is this method manufactured or sold?

Our interests concern improving MIG spot welding operations.

"J" — Conn.

**MM — For more data on this new joining process, write to Olin Mathieson, Metals Division, 400 Park Ave., New York 22.**

## Gotta Good Cleaner?

Sirs:

Somewhere in this country there is a person or firm having a wonderful aluminum cleaner for removing dirt and stain from aluminum furniture, equipment and utensils.

I have need for this type of product or formula since I sell to people who could use such an item.

Can any readers of MODERN METALS help me obtain a formula or bulk product which could be put up for me under my own brand label? I would answer every inquiry received.

"M" — N. J.

**MM — There are probably no more than 200 "good" cleaning compounds for aluminum. We assume, however, that you're looking for a product that could be packaged in a tube, jar or can for sale to consumers.**

**Anybody interested in this man's proposal? We'll forward all inquiries.**

## Reroll Revolution

Sirs:

I will be interested to know what general reaction you have had from others as to the rolling mill story in the November issue ("Reroll Revolution," Nov. '60, P. 30).

From where I sit I think you did a workmanlike job. While it is not to be expected that in every instance I would have exactly


# SALESMEN WANTED

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Write in confidence, giving full resume, salary, etc., to personal attention of:

**Mr. Aubrey L. Moss, President**

**Production Metals, Incorporated**

**299 Pavonia Avenue, Jersey City 2, N. J.**



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## INDUSTRIAL ENGINEER with ALUMINUM EXPERIENCE

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Requires graduate engineer with Aluminum extruding, buffing, and anodizing experience. Excellent starting salary, fringe benefits, and growth potential.

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**MODERN METALS**
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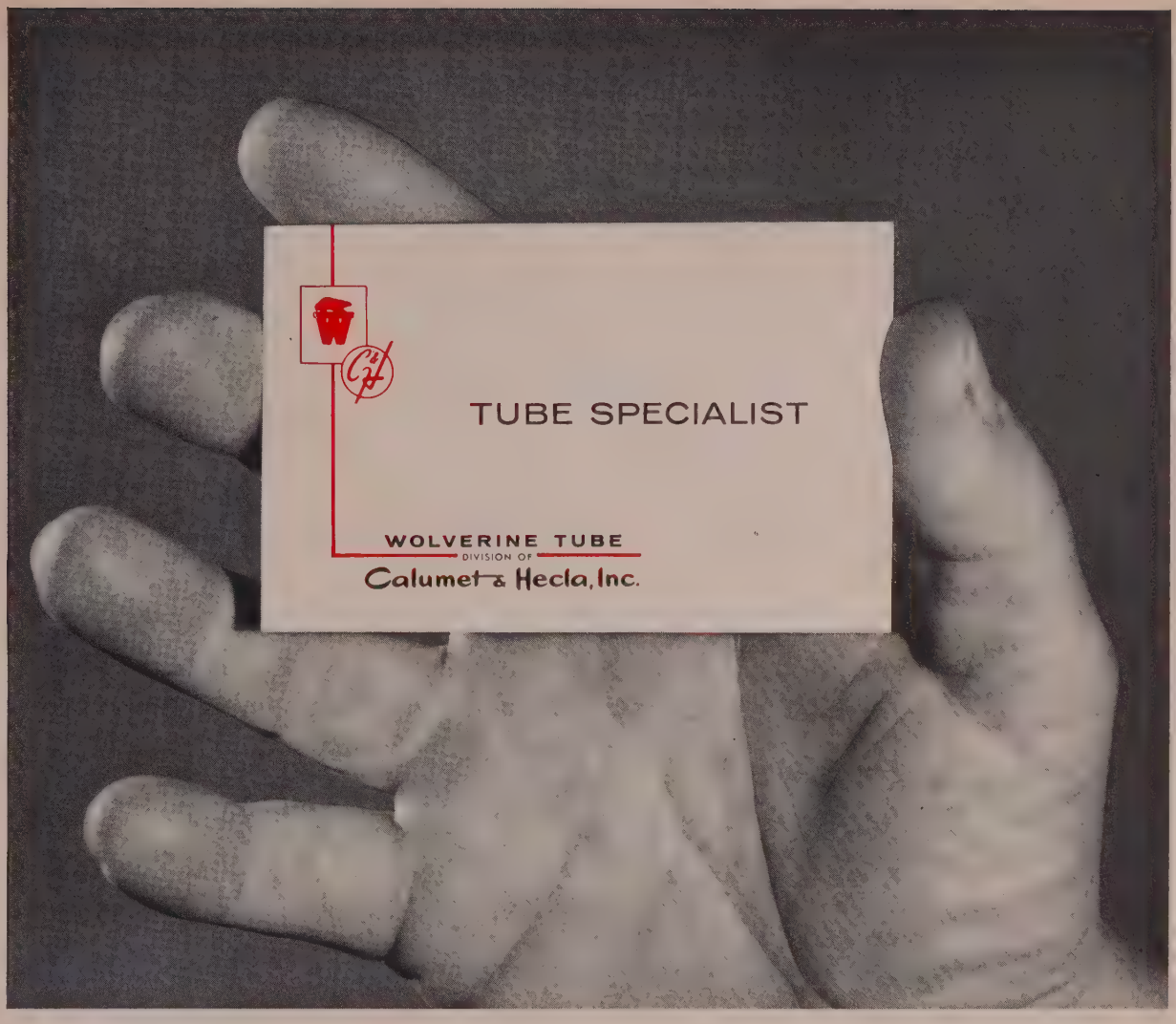


# Ask Your Wolverine Tube Salesman... He Knows...how to give you IOA!

When you deal with a Wolverine Tube salesman you'll be aware of service over and above that which you normally receive.

That different "something" is IOA—INDIVIDUAL ORDER ATTENTION—a subject that is close to the heart of all Wolverine personnel.

For example, because Wolverine specializes in the manufacture of seamless drawn and extruded aluminum tube, your Wolverine salesman knows this product thoroughly—has the experience and product knowledge needed to help you obtain maximum value for your tubing dollar. He can also show you how other Wolverine services such as production line packaging, Field Engineering Service and extensive plant facilities can be of advantage to you.

Next time you order seamless drawn or extruded aluminum tube—specify Wolverine—have the Wolverine salesman show you how IOA works for you.

WOLVERINE TUBE
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the same viewpoint as yours, I think it was a piece of good, fair, objective reporting.

"W" — New York

**MM — This refers to our report last month on the scheme under which Aluminium Limited will join forces with three U. S. producers of aluminum sheet to build a big hot rolling mill. We haven't heard much on the subject since then. Construction of the mill will take two years, and a lot can happen in the aluminum sheet game in that time.**

### Who's the Man?

Sirs:

Unless my calendar has gone haywire again, it's Man-of-the-Year time.

Who will it be this year? Any surprises — like the time you picked the whole aluminum distributing industry?

"K" — Ohio

**MM — The really big surprise in this annual feature is that we somehow manage to get the story researched, written and published.**

**We are now tracking down our light metals "Man of 1960," and he's a stand-out personality in the growingest segment of the aluminum business this year. It'll make a helluva yarn — if we can get it finished in time for the January issue.**

### Found: Porous Metals

Sirs:

In the October issue of Modern Metals, in the "Letters" column, I see that porous aluminum, in sheet form, is wanted.

During the war I was connected with the manufacturing of sheet nickel. The same method could be used for aluminum. So if the method of producing porous nickel is worth anything, I can furnish the method.

The metal is first a plastic sheet, full of powdered aluminum or nickel, then sintered in an electric furnace under hydrogen atmosphere, then annealed, then rolled to get the desired porosity.

Have them contact me if desired.

"W" — Ark.

Sirs:

We are currently manufacturing porous bronze sheets in the size range desired.

As suggested in the article, please forward the correspondence and we will contact him directly. Thank you very much for your attention to this matter.

P.S. Your readers may be interested in a full color movie on powdered metal, or the flow rate vs. pressure drop graphs on our porous materials. Both are available at no charge.

"J" — Calif.

**MM — We have forwarded both communications to the person who inquired about porous sheet metal. Hope they can fill the bill.**

### Foil Scrap

Sirs:

I am interested to buy aluminum foil scrap which has been rolled together with paper . . . and used as wrap for cigarettes, candies, butter, etc.

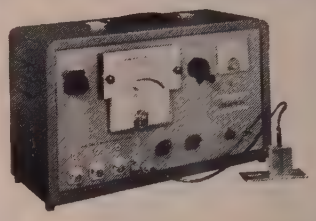
Could you advise me which firm or company in the U.S.A. handles this type of aluminum scrap?

As a subscriber, I would appreciate very much your kind help.

"E"—Buenos Aires

**MM—While there are a great many scrap dealers in the U.S.A., we don't know of any who collect what you seek. It is perhaps too bulky to be commercially valuable.**

NEW!
DERMITRON
NON-DESTRUCTIVE
COATING THICKNESS
TESTER



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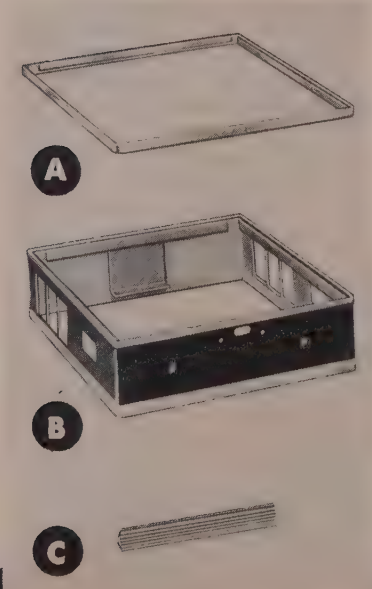
# TEAMWORK FROM G.E.I.

## Helps **WEBCOR** Produce This New Tape Recorder




The 1961 line of Webcor sound reproduction equipment features this new Model 2101 Royalite tape recorder. Weighing only 19 lbs., its case contains three vital extruded aluminum parts produced by General Extrusions Inc. The top trim (A) is punched, formed and Generalsatin anodized. The main frame (B) is drilled, punched, mitered, formed, Generalsatin anodized and spray-painted black in G.E.I.'s modern plant. The handle (C) is drilled, polished, mitered and Generalbrite anodized.

This is another example of a leading manufacturer turning to General Extrusions Inc. for assistance and teamwork in getting a new product on the market. Not only were the engineers of G.E.I. able to meet the close tolerances required by Webcor, but G.E.I.'s production facilities also were capable of producing the job in large quantities in time for the Christmas selling season. If you have a new product on your drawing boards, why not let G.E.I. help pull the pins?

Write for our new catalog on stock dies and standard warehouse items.

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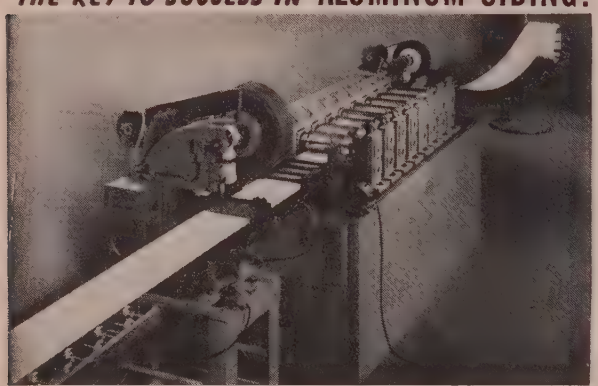

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596 River Road, Clifton, N. J.

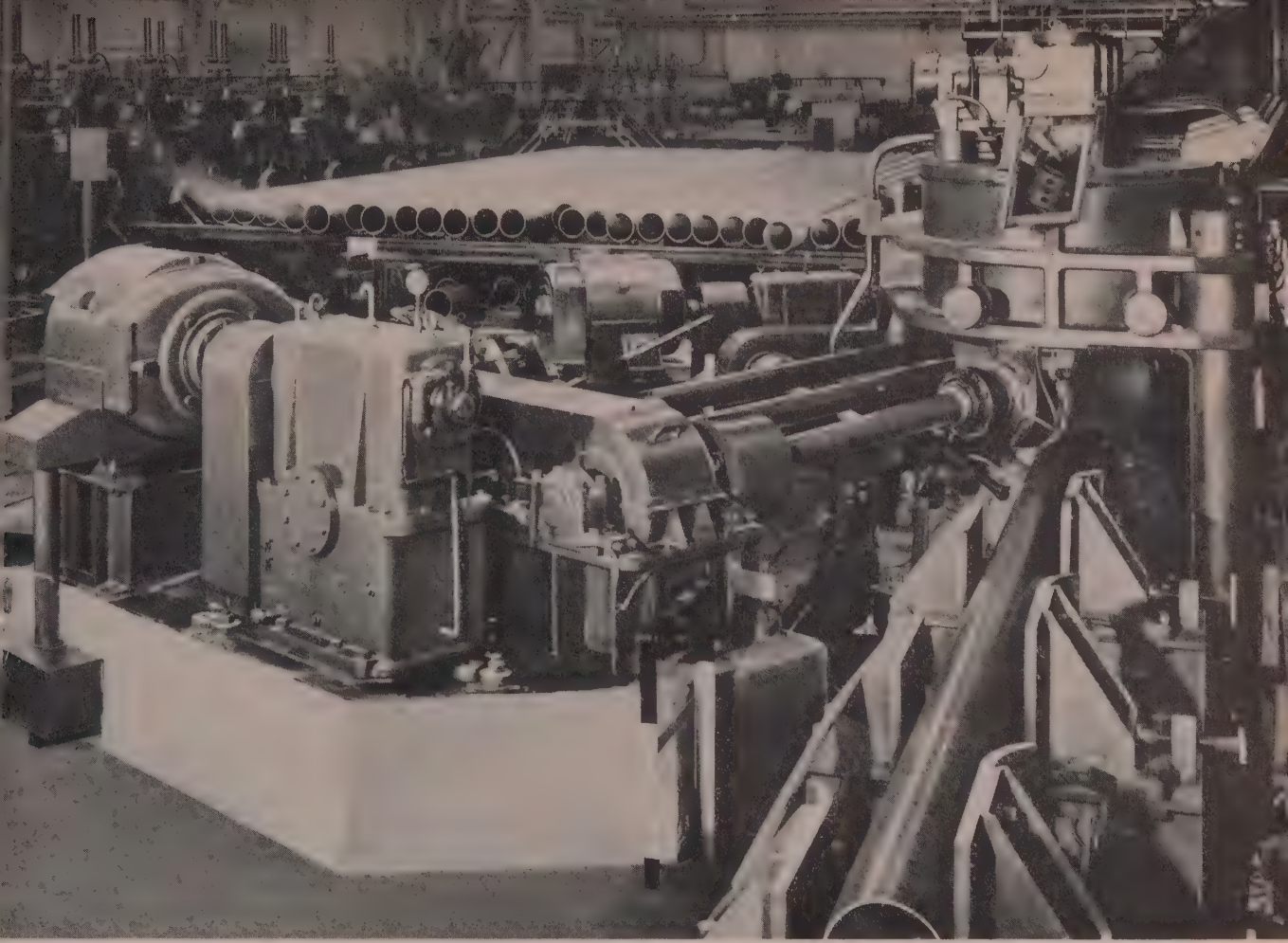
# Here and There

**Hard Anodized Moulds** » » Aluminum molds that have a hard anodized surface seem to be the key to a patented casting process called the Parlanti Mould Process. Dr. Conrad Parlanti developed the method in England and brought it to the U. S. several years ago, setting up the General Communication Co. in Boston to use the process and license it to other foundries. The anodized mould allows the molten metal to cool evenly, thus producing a grain structure of such density that the castings are reported to approach the physical properties of forgings. Currently, the process has had successful application to aluminum, magnesium and steel. However, titanium has been proved capable of casting by this process, and experiments are under way using one of the exotic metals. Typical shapes cast at General Communication by the Parlanti method are wave guides, valve bodies, tape reels for computers, and others. A recent new licensee as a user of the Parlanti Mould Process is the Swedish Crucible Steel Co., Detroit, who does a lot of foundry work in the auto industry. Swedish Crucible also makes moulds, ladles and crucibles for the foundry industry.

**It Moisture-Proofs Curtain Walls** » » A curtain wall insulating material having the same rate of thermal expansion as aluminum is reported to raise the efficiency of curtain wall panels, providing a complete barrier for all metal-to-metal, thermal conductivity. The plastic formulation is called Insu-Wall and resembles the material sometimes used for counter tops. Strips of Insu-Wall are fitted into the extrusion slots and specially pinned against shearing stresses. An epoxy resin gives permanent adhesion. Tests have shown that Insu-Wall has a U factor of .408. The insulated glass used as part of the curtain wall in the same test had a U factor of .58. At a temperature differential of 105° F. at 35% relative humidity, condensation and frost formed on glass before forming on metal. Developers of this interesting product are Marmet Corp., Wausau, Wis.

**Beryllium Production Increasing** » » There is sustained activity in that cozy little field devoted to beryllium. The nation's two producers of beryllium ingot and wrought products are expanding their facilities, stepping up the promotional effort and generally making noises that promise well for the future. Standard Beryllium Corp., a leading supplier of the ore, reported record sales and earnings in the first half of this year. Sales for the period amounted to $219,889, and earnings after taxes came to $20,487, reminding everyone that the industry, as important as it is, is still one of limited applications, small tonnages and even smaller profit. Standard Beryllium's president, Philip L. Brandon, noted that the Defense Department is now spending about $1 million annually on beryllium research. He said beryllium is now used in gear trains, housings, and fine machinery parts. The control vanes for the Polaris missile are now being made of beryllium, and it is expected that

(*Continued on page* 18)



# How to straighten the really big pipe!

One major Eastern steel producer has found the answer – the big Mack-Hemp Model A-5 Straightener shown above – the largest of its type in the world!

This A-5 takes really big bowed pipe from the sizing mill, pulls it in through three pairs of opposed cros rolls and then spins it out straight and round to hig tolerances in only a single pass.

This despite the fact that the steel pipe being straightened is 16-inch in diameter, fifty feet in length!

To do a job like this, of course, the massive 85-ton roll frame is a must, as are the heavy duty rolls, and the combined 200 HP motors used to drive all six of them In its first year, this Mack-Hemp A-5 straightener has handled more than 200,000 tons of pipe.

If straightening pipe or tubing is your problem – any size, any alloy – consider doing it yourself. The men from Mack-Hemp will be glad to give you all the facts you'll want to know.

Dept. 122

**MACKINTOSH-HEMPHILL**
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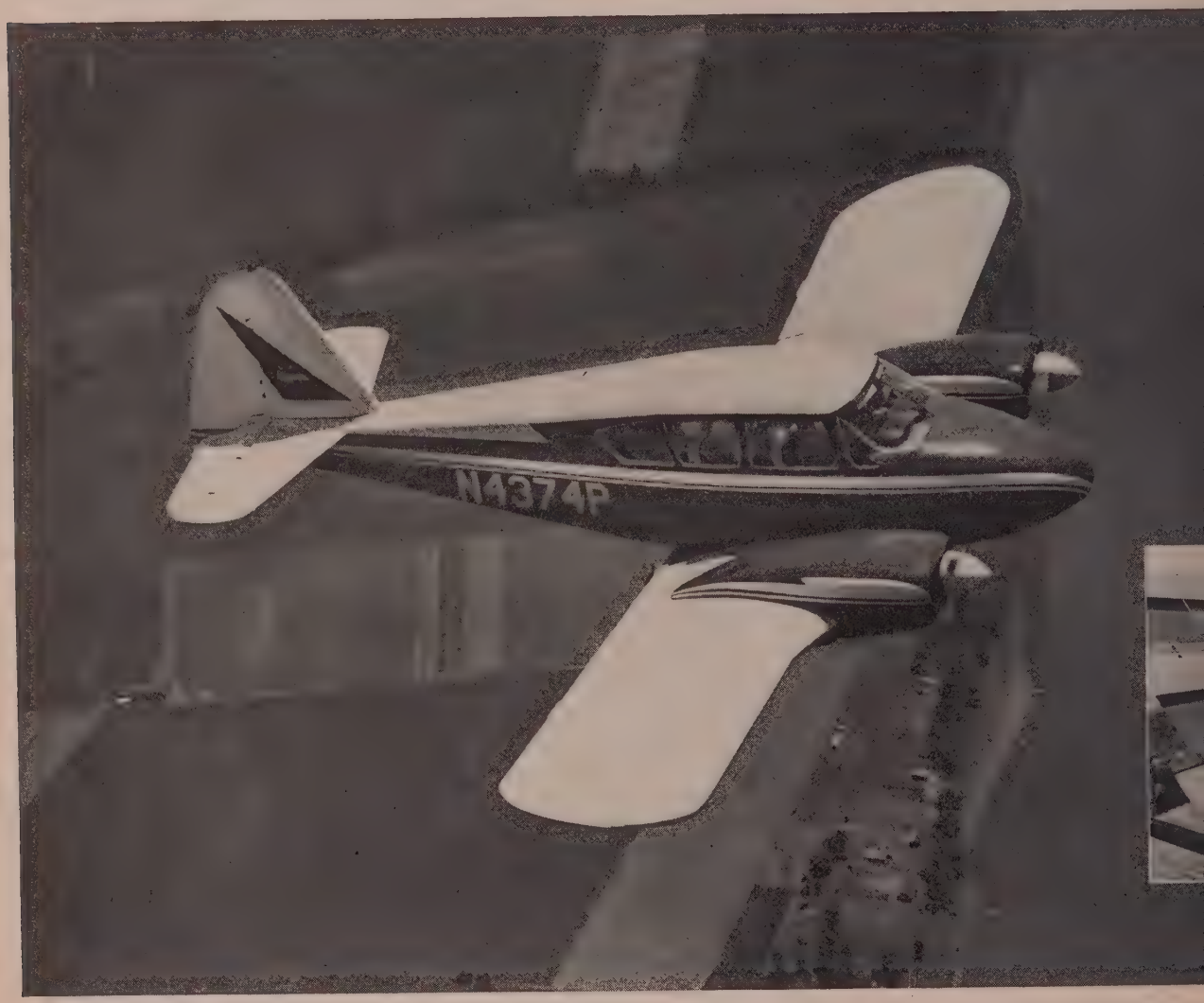
## 12 Years and 22,000 Aircraft Later...

# Amchem ALODINE* Continues Protection on Piper Aircraft




Another famed Piper model—the "APACHE"—flown by discriminating aircraft owners for business and pleasure the world over. If it's popular, it's a Piper!

# to Insure Paint Bonding Aluminum Parts

Pioneering the commercial aircraft field since 1928, Piper Aircraft has compiled an amazing production record—*over 50,000 planes* produced during that time!

Amchem's Alodine record at Piper's Lockhaven, Pa. plant is equally amazing—since 1948, the aluminum parts on 22,000 Piper craft have been treated with Alodine for corrosion protection and outstanding paint bonding insurance!

Utilizing a straight-line, 7-stage dip Alodine tank system, Piper production experts turn out pre-paint protected aluminum parts ranging in size from 3/8-inch rivets to 10½-foot aft section skins. Piper officials, alert to the fact that aircraft are sold on looks as well as performance, back up the 12-year record of Alodine with quotes like these—

"My proof that we have a better finish is the fact that we don't have customer complaints from the field. We attribute it to the Alodine process which gives us the good paint bond we need." (Richard Gehret, Finishing Superintendent)

"Alodine is contributing to higher Piper quality, higher customer satisfaction, reduced complaints because the customer expects and gets a quality finish." (Findley Estlick, General Superintendent)

Piper uses over one million pounds of aluminum annually, fabricates ten to twelve thousand distinct and different aluminum parts . . . each and every one Alodized with Alodine to provide 1) unequaled corrosion protection, 2) excellent paint adhesion, 3) valuable ammunition that helps sell Piper's quality products the world over.

If you make any product with aluminum—there is a use for Alodine, the superior pre-paint conversion coating chemical!

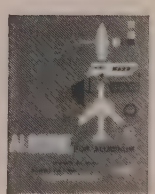
*Amchem's registered trademark for its aluminum chemical conversion coating.

Al Sharp, Methods Engineer in finishing division, checks Piper exposure test racks where paint adhesion efficiency is carefully evaluated under severe environmental conditions.

Heart of the 7-stage dip Alodine system. Aluminum parts are stacked in rack-hung baskets suspended from monorail over the first three stages of the Alodine line.

The "grand old man of aviation," President W. T. Piper, poses on the flight line alongside one of the latest models bearing his name—the Piper "Aztec," last word in luxury flying.

AMCHEM **ALODINE**



*Write for Booklet 1424C, contains detailed information on Alodine, plus handy Selection Chart.*

Amchem is a registered trademark of
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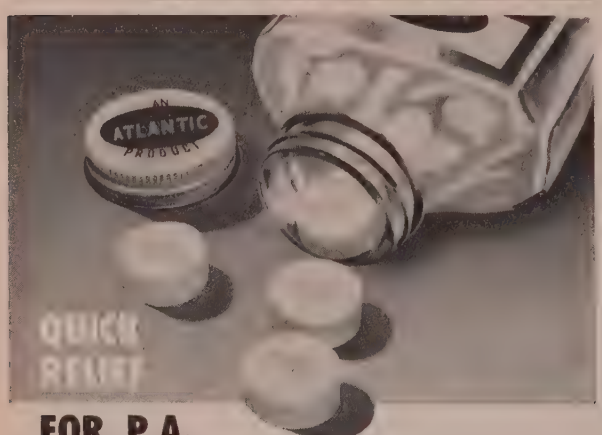


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ATLANTIC ALUMINUM


leading edges for wings and control surfaces for high speed planes will shortly be made of beryllium. Meanwhile, out at Cleveland, Brush Beryllium Co. is spending $3 million for a plant that will boost by 50% the firm's capacity to fabricate beryllium metal. Brush has the ability to produce about 24,000 pounds of beryllium billet monthly.

**Scooters Are Catching On** » » Despite high accident rates and insurance claims, the motor scooter is growing more and more popular as five or six manufacturers here and abroad cater to an increasingly adult clientele; a West Coast dealer who sells the Cushman Motors version of these handy little vehicles reckons that about 95% of his customers of the past year have been grown-ups. But scooters cannot be said to be catching on "like wildfire," for while their economy and convenience are big attractions for many people, many Americans have a distinct aversion to the contraptions. Parking lot attendants are, in many cases noticeably inhospitable; cops view them with jaundiced eyes; motorists (auto drivers, that is) hate them. Even so, we've a hunch scooters are here to stay, and will doubtless call on increasing tonnages of aluminum castings and extrusions.

**Something to Cheer About** » » Production of 200,000 pre-fabricated homes by National Homes Corp. was given fitting recognition at the company's Lafayette, Ind. headquarters last month. It took the Price brothers only 20 years to do this, which might be another reason for the strong sense of achievement they must be enjoying, these days. As part of the celebration, board chairman James R. Price announced that the company is putting on the market a new Comet Series — a five-room, 912 square-foot home that will sell for as little as $6450, plus land. What a boon this will be for the low income family — always assuming, of course, that local codes will allow erection. Price pointed out that the new series is priced $500 lower, f.o.b. Lafayette, than the company's low-priced Fairlane was in September, 1958. Surveying the 1961 housing market, Price said: "The market has taken a turn for the better. Buyer confidence is returning. Mortgage financing restrictions which dampened the market have eased off, at least for the present, and the inventory of unsold homes has been reduced. Second-time buyers dominate today's market. They want more space for their growing families and they want more quality features that will reflect their increased incomes." Price also noted that a large precentage of current buyers are now buying their second National Home. An amazing facet of National Homes operations is that in the three years during which the company has handled aluminum, the ratio of aluminum homes to wood has grown to 9:1.

**Pointless Pilfering?** Hussman Refrigerator Co., St. Louis, recently caught a "trusted employee" who had been robbing the firm of steel and aluminum sheet. This is sort of surprising; we thought the stuff wasn't worth stealing, prices being what they are nowadays.

**Think what you can do with an open coil.** Lee Wilson engineers, ever searching for better ways to anneal metal coils, scored an important breakthrough by devising a workable method for opening the coil laminations and for handling large opened coils of steel and non-ferrous metal to expose all coil surfaces to contact with high velocity heated gases. This has proved to be the most effective way to anneal yet discovered. But there's more—already Lee Wilson engineers are considering how to apply the open coil system for cleaning, coating, and gas alloying, in addition to annealing. Think what complete exposure of all of the coil surface means to your processing of coiled metal products. Then contact Lee Wilson engineers for complete details.

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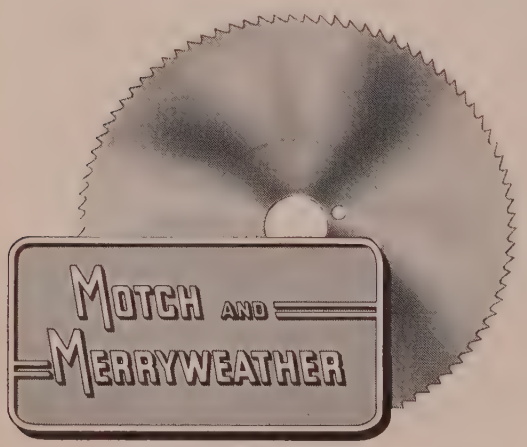


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# Useful Data

**Extruded aluminum shapes** by General Extrusions are covered in a new catalog. Information includes typical mechanical properties, descriptions of standard mill and special finishes, angularity, corner and fillet radii, length and shipping tolerances of straightness, twist and diameter, for rod, bar, etc. Some extrusions are illustrated and trade phraseology is defined. Special section lists General's services and facilities. For a copy, write Fred Schuler, General Extrusions Inc., 4040 Lake Park Road, Youngstown, Ohio.

**Pre-colored aluminum sheet**—Colorweld 60—used to make commercial-industrial building products, is described in a Reynolds brochure. Publication contains color swatches of all 20 standard colors offered. Details are given on how Colorweld is made and where it may best be used. Booklet claims Colorweld 60 aluminum sheet is fabricated into products without variations in the color thickness or breaks in color coverage. For a copy write Reynolds Metals Co., Dept. PRD-39, Box 2346, Richmond 18, Va.

**Saws** for straight, miter and angular cut-off work are described and illustrated in catalog 59-39 by DoAll. Manual and fully automatic units are covered. Table lists new standards for cut-off rates. Other tabular matter presents data for various types of cuts. Additional information in the 12-page booklet is on various components of the units. For copy write C. H. Rosene, The DoAll Co., 254 Laurel Ave., Des Plaines, Ill.

Your questions on aluminum **melting-holding furnaces** for use in permanent mold, sand or die casting plants can be answered by bulletin SEC-12 by Sunbeam. It describes the casing, burners, thermocouple well, hearth, insulation and removable roof of its type MH furnace. Specifications and sizes for side and end dip models are given. Other information includes applications, advantages, etc. of new units. For a copy write R. K. Stephenson, Sunbeam Equipment Corp., Meadville, Pa., or call him at 6-1131.

Complete details on **porcelain enameling** your aluminum products can be obtained in a booklet by Aloxon. It claims porcelainized aluminum resists corrosion, discoloration and abrasion, and that the coated metal can be bent, drilled, sawed or sheared without spalling the coating. Other information provided includes design factors, a listing of advantages the firm claims for its process, and a description of the company's guarantee. For booklet write Alan H. Harris, Aloxon Corp., Madison Heights, Mich.

If you want information on **strip coating aluminum** or steel, Zegers Inc. will send you a booklet describing its new process for applying decorative and protective finishes to metals. The process—Zelite—is shown in step-by-step, fully illustrated form. The booklet says you can get Zelite finishes in clear and all standard

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# ALUMINEWS

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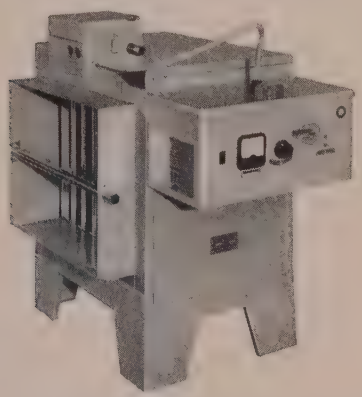
Closely-spaced Kaiser Aluminum Alloy 3003 sheets serve as washable dust collectors in electronic air cleaners made by Electro-Air Company, Inc., of McKees Rocks, Pennsylvania.



**Commercial units** *clean as much as 100,000 cu. ft. of air per minute in forced air ventilating systems. Built-in flushing system washes dirt from aluminum collectors.*

These cleaners are so efficient that they rate a "90%" in National Bureau of Standards tests. This means that 90% of all the smoke, pollen and dust—even bacteria and virus—is removed from air passing through just once.

Airborne particles entering the cleaner pick up a powerful ion charge from patented Electro-Air ionizer grids. Then as the air passes between aluminum plates, the charged particles cling to the aluminum. Clean air passes out.

The aluminum collector cell is cleaned out every week or two by a built-in hot water flushing system.

To get the corrosion-resistance required, Electro-Air uses .020 gauge Kaiser Aluminum Alloy 3003 H14 temper sheet—which stands up against years of soot and dirt and repeated hot water exposure.

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**Titanium alloy** Ti-8Al-1Mo-1V, raising by 25% the metal's temperature ceiling for use in jet engines, is discussed in a new data memorandum. The 12-page manual uses graphs and tables to cover the metal's creep, stability and fatigue properties. Also outlined are forging and heat treat procedures. The booklet says the alloy has already been incorporated into preliminary designs of military engines for such components as discs, spacers and blades. Write R. J. Waternotte, Titanium Metals Corp. of America, 233 Broadway, New York 7.

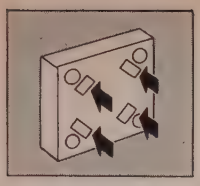
Interested in **crucibles, stopper heads, graphite refractories?** If so, Vesuvius Crucible Co. will send you a catalog describing such equipment. All products are illustrated and height, top, bottom and bilge diameter, working capacity, etc., are given. Covered are crucibles for melting aluminum and other metals, base blocks, stirrers, skimmers, crucible covers, ladle liners, induction furnace crucibles, etc. A special section is devoted to care and use of crucibles. To obtain your copy, contact James Mutchler, Vesuvius Crucible Co., Swissvale, Pa.

**Seam and roll spot welding** using a new air operated, press type, three-phase resistance unit, type MPT-2, is detailed in Sciaky bulletin 320-8. To enable you to determine if the unit fits your manufacturing needs, data has been tabulated to indicate available KVA range, throat depths, welding currents, electrode forces, etc. Also listed are standard and optional equipment. The unit and several of its components are illustrated. For a copy contact W. S. Rudin, Sciaky Bros., Inc., 4915 W. 67th St., Chicago. Phone PO. 7-5600.

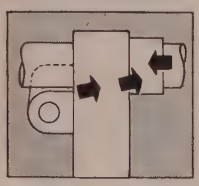
**Railroads' use of aluminum** has started to increase lately, and the future looks even better according to Modern Metals reprint, "How Aluminum Will Serve the Railroad Revolution." The article details current uses aluminum has been put to by car manufacturers and what future applications are likely to be. For copy of reprint, contact Paul Messer, Modern Metals, 435 N. Michigan Ave., Chicago 11.

**Electrolytic process** unit designed to prepare hard-anodized samples in the lab and to do prototype work is detailed in folder by Allen Aircraft. Booklet explains how Allen-Dizor Model 500 can perform eight various tasks including anodizing, electropolishing, etc. Typical parts anodized by the unit are illustrated. For copy contact Sales Manager, Allen Aircraft Products Inc., P.O. Box 271, Ravenna, Ohio.

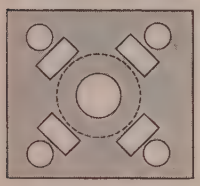
How to specify **finishes for magnesium** is covered in an article reprinted by Dow Metal Products Co. Discussed are the availability and relative merits of chemical treatments and paints that can be used on this light metal. Data includes cleaning methods, acid pickling baths, chemical treatments, a comparison of resin coatings, estimated costs, and a listing of commercial finish systems for magnesium. You can get a copy from Clayton Dickey, Dow Metal Products Co., Midland, Mich.



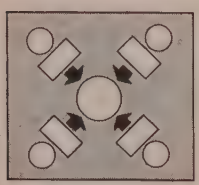
**1.** Each corner link is a strong, self-contained support for both plate and die.



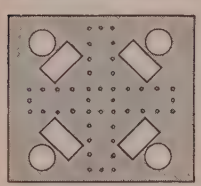
**2.** Short and direct transfer of loads on each corner minimizes bending stresses on the moving die platen and back plate.



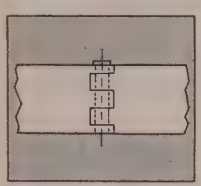
**3.** Reduces the area of unsupported moving die plate. Helps eliminate flashing and potential cracking of dies.



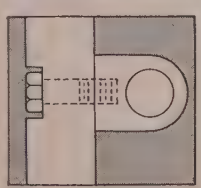
**4.** Prevents weaving of the link center axis (crosshead) and consequent unequal loading.



**5.** Permits a large area of both horizontal and vertical bumper pin ejection pattern.



**6.** Corner positioning of each link assembly results in equal and straight line loading of all pins and bearings in the link pivots.



**7.** Toggle anchors are bolted to the back and traveling platens. They are not subject to weld breaks or breakage as part of a casting.

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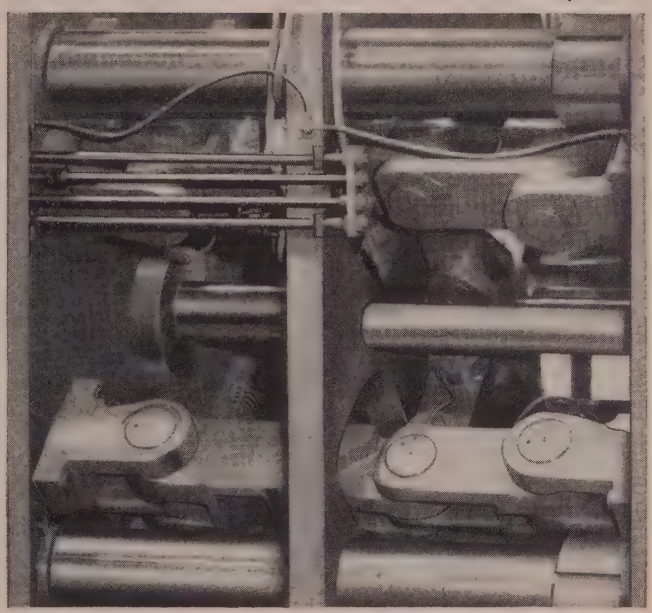
## in Greenlee–B&T die casting machines offers you 7 benefits



Only in Greenlee — B&T Die Casting Machines will you find this unique toggle locking mechanism. Investigate its many advantages that help give you greater holding power, best die alignment and lower maintenance. Your Greenlee — B&T representative will be glad to arrange for a demonstration.

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# New Enterprise

A program for the expansion of three plants has been developed by Bohn Aluminum & Brass Corp., Detroit. Largest phase of the program will be at the Danville, Ill., **heat transfer equipment plant,** which will be expanded 20%. The Foundry Division's Butler, Ind. facilities for permanent mold castings will be enlarged, and melting, production and laboratory equipment added. The South Haven, Mich., plant, which produces pistons and castings, will have a new engineering building to house all piston personnel.

Worcester Pressed Steel Co., Worcester, Mass., has produced 250,000 aluminum **safety hats,** president Carter C. Higgins reported. The new (for Worcester) product, produced on the company's own equipment, is all one size. It's the plastic band inside that adjusts to the head.

An aluminum **extrusion plant** was scheduled to open this month in Harderwijk, Holland, according to Kruger Paper Co., Ltd., Montreal, Canada, a major shareholder. Production of the facility will be aimed at providing window frames, doors, curtain walls and components for the shipbuilding industry.

A versatile, easily installed **aluminum handrail system** is being mass produced at Aluminum Railing Corp., Las Vegas, Nev. Called Alurail, it is designed for industrial, school, commercial and residential applications. Specially designed installation accessories conceal bolt anchorage to walls and floors and eliminate welding or pipe threading.

A 4-high reversing **cold rolling mill** is being designed and built by Pittsburgh Engineering and Machine Division of Textron Inc. for Manufacturos de Cobre, S. A. (Madeco), Santiago, Chili. The new mill will roll aluminum, brass and common grades of copper at speeds ranging from 300 to 600 fpm. Delivery is slated for the spring of '61.

**Hollow aluminum bar stock** manufactured by Harvey Aluminum, Torrance, Calif., is being distributed by Fullerton Metals Co., 6605 W. Fullerton Ave., Chicago, which operates branch warehouses in Milwaukee, Minneapolis, Tampa and Hialeah, Fla.

The familiar **newspaper tube** used for roadside delivery is getting a bright new look in Virginia. Richmond Newspapers Inc. is installing white enameled aluminum tubes in its circulation area. Tubes are made from Reynolds Colorweld sheet by Berkley-Small Co., Mobile, Ala.

A strip line specially designed to produce aluminum sheets for **can stock** has been installed and is in production at the McCook, Ill., rolling mill of Reynolds Metals Co. The line uses sheet made in the plant, cleans it and cuts it to meet can making specifications.

The "flying shuttle," an innovation in wire weaving, has helped to double the production of **aluminum in-**

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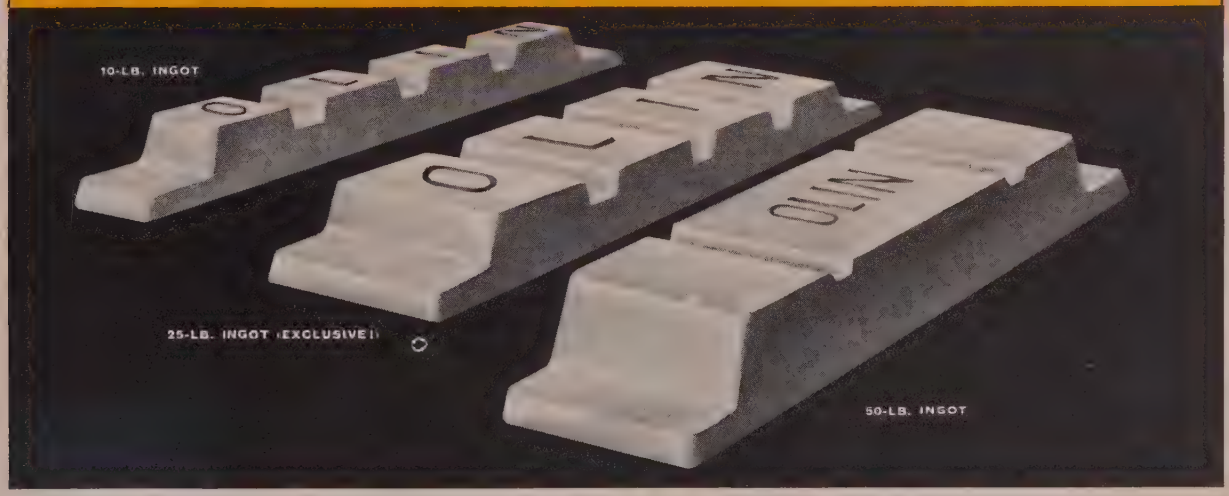
## OLIN ALUMINUM PIG, INGOT AND BILLET

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**sect screening** at Dodge Wire Corp., Covington, Ga. Used on new high speed looms, the shuttle grasps and shoots individual strands of fine aluminum wire across the width of the weaving machines 250 times a minute. Warner & Swasey Co., Cleveland, developed the machines which weave cloth in widths up to 50 inches.

A new 40,000-square-foot plant has been opened by Aluma Kraft Mfg. Co. at 1030 Manchester Road in St. Louis County, Mo. Plans call for the transfer of a 14-inch wide **siding roll coat paint line** and 48-inch wide awning roll forming equipment from the main plant in Webster Groves. Manufacturing will continue at the old plant while raw material storage and end product inventories will be controlled at the new facility.

A plant designed and equipped for the assembly of special purpose motor vehicles has been leased on a long-term basis by Consolidated Diesel Electric Corp., from Schenectady Industrial Corp. The lease contains an option to buy the Niskayuna, N. Y., plant. Specific products to be assembled at the plant have not been disclosed, but it is known that Condec's Aircraft Equipment Division holds contracts totaling nearly $15 million for **engine-driven vehicles** designed to service the fluid requirements of aircraft and missiles.

Permission to build a $13.5 million **aluminum reduction plant** has been granted Reynolds Metals Co. by the Venezuelan government. Half of the 25,000-ton capacity plant will be financed by Reynolds, the other half by Venezuela. Approval of the project was delayed over a year because some members of President Romulo Betancourt's coalition government oppose foreign investment.

**Impact extrusion** has been added to the services offered by Brooks and Perkins, Inc., 1950 W. Fort St., Detroit. Impact extruded parts made of aluminum, titanium, magnesium, steel, copper or brass can be produced.

In an effort to complement its stationary tool line Rockwell Mfg. Co., Pittsburgh, has agreed to buy Porter-Cable Machine Co., Syracuse, N. Y., manufacturer of **portable electric saws,** electric gardening equipment, sanders, etc. Both lines of products require large numbers of aluminum die castings. By exchanging approximately seven Rockwell shares for 10 Porter-Cable shares, Rockwell would acquire the firm at a cost of close to $7 million. A Porter-Cable shareholders' O.K. is all that is needed to close the sale.

For a total price of $3,625,000, Webcor Inc. acquired the outstanding stock of Dormeyer Corp. Both are Chicago firms. Dormeyer, producer of **small electrical appliances,** was owned by Titus Haffa and members of his family. Haffa is chairman of Webcor. To make the purchase Webcor issued 290,000 shares of stock at $12.50 per share.

**Compression nuts** made of aluminum, brass, steel and stainless are being impact extruded in all commercial sizes by the Jacobson Nut Mfg. Corp., Kenilworth, N. J.

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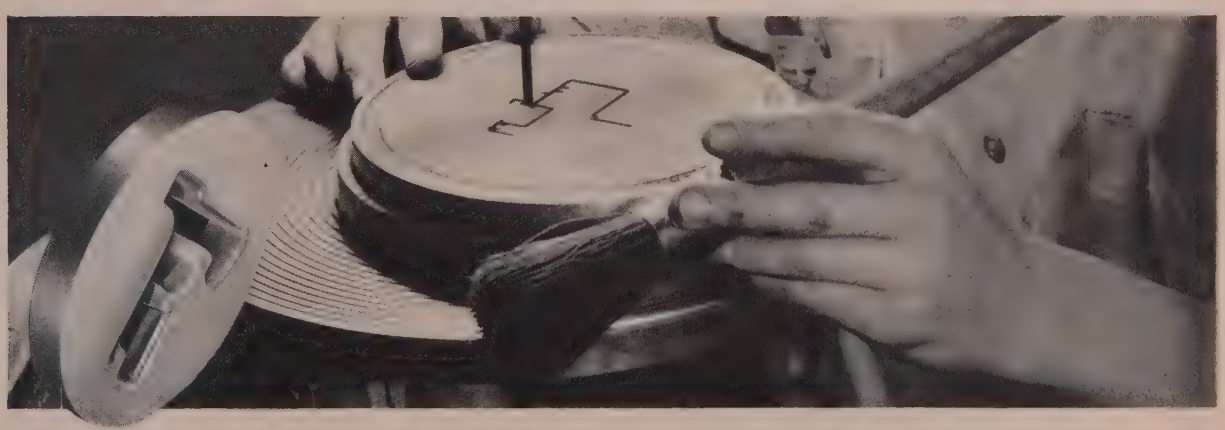

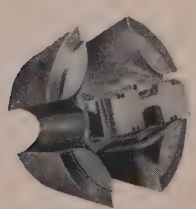

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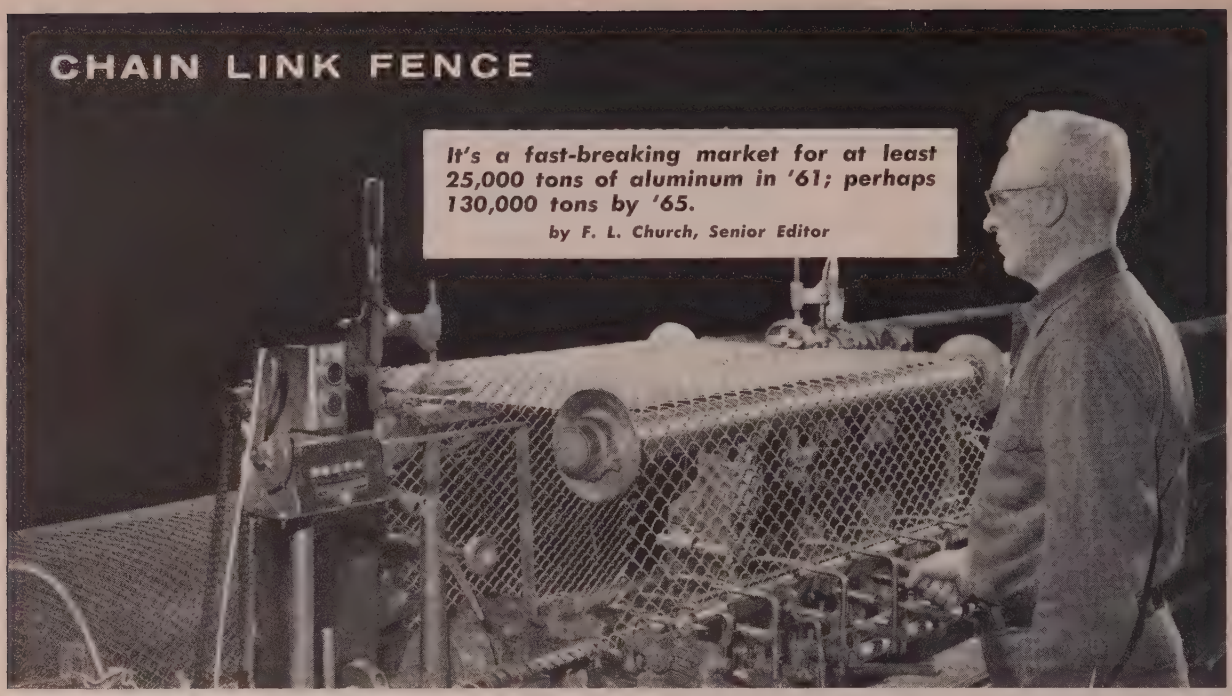
# CHAIN LINK FENCE



***It's a fast-breaking market for at least 25,000 tons of aluminum in '61; perhaps 130,000 tons by '65.***

***by F. L. Church, Senior Editor***

A NEW MARKET for at least 7000 miles of fencing was created by the nation's home builders this year.

Home improvement trends reveal that 60% of the estimated 1,250,000 single-family, non-farm dwellings started this year will get some sort of fence within three years. This means that some 750,000 residences built in 1960 will be fenced by 1963. If they average only 50 feet of fence each, they will generate a market for about 37,500,000 feet of fencing.

And this is only a small part of the residential market for fencing. Sales experience with other home improvement products suggests that the really big potential lies in the replacement business; i.e., older homes.

A few enterprising manufacturers of the familiar chain link fence (see front cover) believe they can capture a sizable share of the residential fence market, and they're counting on aluminum to do it. Their reasoning makes sense.

Although the prosaic wood picket fence is probably the standard for residences, homeowners are becoming more and more metal conscious. They are being sold on the durability and maintenance-free qualities of aluminum prime windows, storm windows, siding, roofing, awnings and other building products.

Why not cash in on this "pre-sold" state of mind by offering the homeowner an aluminum fence that won't rust, rot, or whet the appetite of termites? He may pay more for it, but he won't have to paint it or mend it every four years, and he won't contend with a sagging gate or rotting posts.

There's nothing new about an aluminum fence for homes; several have been on the market for a number of years. But most of these are variations on the picket fence theme. The chain link enthusiasts contend that a metal fence—whether for home, farm, playground or plant—should be designed for metal, not as an imitation of a wood fence.

To these enthusiasts, chain link fencing is the answer. Its woven wire construction is inherently tough, they contend. It puts metal to work in the most efficient manner. As proof of its acceptance, they cite the thousands of industrial, commercial, institutional and government installations that are protected by chain link fences.

## Most of It's Steel, Now

So far so good. But better than 90% of the chain link fencing made in the U.S. is galvanized steel. Until this year, aluminum had barely made a dent in the market—even though aluminum chain link has been commercially available for nearly 15 years, and the metal boasts some crucial advantages over galvanized in this application.

Nevertheless, the manufacturers who have set their sights on the residential market are counting on aluminum chain link to make their bullish forecasts come true. Their reasoning is expressed most forcefully by aluminum chain link's most dedicated evangelist—James D. Case, sales manager, Mill Division, of Nichols Wire & Aluminum Co., Davenport, Iowa.

***Photo above shows machine at Nichols Wire & Aluminum weaving new 1-inch chain link.***

Nichols was the first in this country to weave aluminum chain link on a commercial scale. Right after World War II, the company was on the prowl for new markets for its aluminum wire; figured that aluminum could give steel a lively battle in the fence business.

"At that time we estimated that aluminum chain link became the cheaper fence only after a competitive galvanized job had two scrape-and-paint jobs," Jim Case explains. "Since then, maintenance costs have increased so fast that we can now show that aluminum becomes less costly after only one scrape-and-paint job on galvanized."

Case believes the balance is tipped still more in favor of aluminum by the increasing acidity of the atmosphere in virtually all parts of the country. Galvanized coatings no longer offer as much protection as they formerly did, he notes, "and the trend to increasing acidity shows no sign of stopping or even slowing down. Thus, aluminum chain link sold today will become an even better buy than anyone might anticipate now."

Aluminum also makes a better looking and safer fence, Case continues. "A rusty fence is a residential menace, particularly for children. And the aluminum job can be downright beautiful —especially after the R5 bright dip, which should become the standard for residential fences. Certainly no aluminum chain link can ever look as ugly as a roller-painted galvanized fence."

Although these attributes have been known for years, they have failed to touch off a stampede to aluminum. The

# AQUADAG® SOLVES AN INTRICATE MOLD PROBLEM FOR OSWEGO CASTINGS

A complete permanent mold, used in casting high-pressure gas meter housings, is shown being sprayed with 'Aquadag'.

The problem at Oswego Castings Corporation, Oswego, New York, a division of Oberdorfer Foundries, Incorporated, involved the effective metal flow and release of aluminum castings. Frequent breakage occurred due to the complexity of the part . . . a gas meter housing containing an integral rib down the center. In the mold core, the relatively tiny aperture for forming the rib, plus the rounded corners which provide the outer "bucket" appearance to the housing, demanded a release agent that would permit easy extraction and proper metal flow.

According to Frank Fox, Production Foreman in the Oswego foundry, previous to adopting the use of an Acheson dispersion, removing the aluminum casting from the rib aperture took as long as three or four hours. Even with such care, sticking caused many castings to break at the point of the rib.

There was also the problem of metal flow. Housing walls vary in thickness between ¼ inch and the ⅝ inch flange which runs around the top. Close tolerances must be maintained to insure a proper fit during final assembly. "Holidays" caused by the improper flow of metal into critical areas of the cavity, presented a constant reject problem.

Several mold washes were tried unsuccessfully before Oswego engineers turned to 'Aquadag'—a dispersion of colloidal graphite in water. In their application, Oswego dilutes the concentrated material 1 to 3 with water. Normal commercial spray equipment is used in applying an even coating on all mold surfaces . . . one coating holding up through a run of eight to ten pieces. The 356 aluminum alloy used for the housing castings, is poured at 1400°F. The mold is preheated to 700°F. and maintained at that temperature through the casting cycle.

With 'Aquadag', the savings at Oswego have been "considerable". Castings are more uniformly formed, have smoother surface finish, and part easily. Because of greatly facilitated metal flow and release, mold life is lengthened. Rejects are the exception rather than the rule.

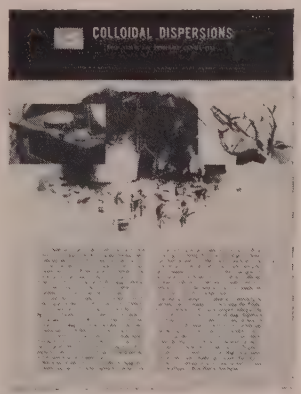
Oswego Castings manufactures several products with highly defined parts which require molds having intricate sliding members or collapsible cores. The fact that finding the effective lubricant they needed to overcome their *most difficult* problem, resulted in the selection of an Acheson product . . . indicates it can be of equal value to you. We invite your inquiry.

## Literature Describes Production Economies In Metal Casting

A detailed discussion of the various Acheson semi-colloidal and colloidal dispersions available for coating permanent molds, die cavities, and steel and cast-iron chills, is contained in Acheson Bulletin 425. It describes why Acheson colloidal graphite is so extensively used as a mold and die lubricant, as well as an extremely effective heat-resistant parting agent. The microscopically fine graphite particles are suspended in a variety of liquid carriers. When mixed with the appropriate diluent, the dispersion can be conveniently applied by spraying, brushing, dipping, or swabbing. As mold coatings they provide greater, more uniform surface coverage. Highly tenacious, these thin coatings resist the scouring action of molten metal, do not volatilize, and will not build up. Sticking in the mold is reduced to a minimum; usually eliminated completely. Less finishing is required, rejects are fewer, and die and mold life is extended.

Additional protection of casting machines, conveyor chains, and other plant equipment is also described in Bulletin 425. The heat-resistant, non-gumming characteristics of Acheson colloidal graphite are ideally suited for the high operating temperatures of most foundry machinery. Should yours be a special lubricating problem not covered in this literature, let us hear from you. Industry experience has been that in our complete product line there is an Acheson dispersion "tailor-made" for your metal casting application.

We invite you to send for your copy of Bulletin 425, "Colloidal Dispersions For Use In Metal Casting", at your earliest convenience. It should prove helpful to you in realizing greater production economies. Write direct to Dept. MM-12.

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main reason: Many of the biggest outfits in the chain link game are steel producers, who have been understandably reluctant to take on a product that could idle a blast furnace.

But two potent factors that recently entered the picture have started the "stampede" to aluminum, according to Case. The first is the Federal Highway program, under which the federal government pays 90% of the original cost of things such as fences for super-roads, but leaves the cost of maintenance to the individual states.

State governments are not notably prudent in such matters, but many state highway commissions *have* seen the light. As long as Washington foots the bill, why not put in a fence that won't need maintenance? Alcoa, Reynolds, Kaiser, Nichols, and others have been effective in putting the aluminum story across to cost-conscious state officials.

The other factor—and Case seems to consider this the stronger one—is the recent appearance of some respected and well-heeled competition in the aluminum chain link business.

Anchor Post Products, Inc., one of the few big chain link firms that do not produce steel, is now cooperating with Reynolds Metals in an intensive campaign promoting aluminum chain link. The Baltimore-based firm has used as much as 1.5 million pounds of aluminum in '60; expects to see a much larger share of its volume go to aluminum next year.

Although this will push Anchor Post well ahead of Nichols as far as aluminum fencing is concerned, Jim Case is triumphant.

"This national distribution, erection and sales promotion by Anchor is just what aluminum needs," he emphasizes. "So long as Nichols and a few other companies merely offered aluminum fabric for sale and pursued the limited advertising approach justified by their operations, aluminum chain link could make only a gradual upward move.

"This is not to say that a number of highly reputable erectors failed to do a bang-up job of selling and promoting aluminum fencing over the past 10 or 15 years. They have done a fine job within the limits of their relatively small markets and promotion budgets.

"But the fact remains that the total market during the formative years from 1946 to the start of 1957 was about a half million pounds of aluminum per year. There was never a strong, clear sign of a breakthrough until Anchor Post put its reputation and its strong position in the industry squarely behind aluminum."

On the strength of these functional, esthetic and economic factors, Jim Case is confident that "aluminum is ready to take the lead away from galvanized, not only in residential fencing, but in all of the traditional markets for chain link fencing."

What will this mean in terms of aluminum consumption? Estimates of the amount of steel used in chain link fencing range all the way from 780 million to over a billion pounds annually. (The actual amount is shrouded in mystery because the steel industry buries statistics for chain link into the total for several products).

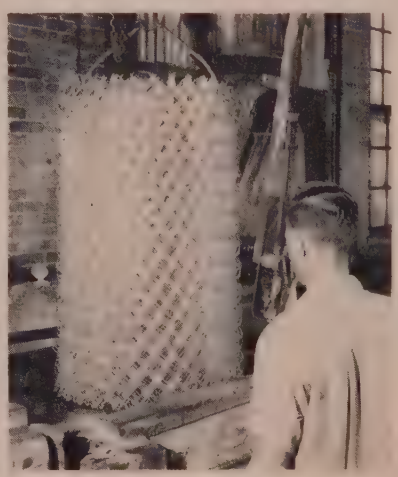
In the unlikely event that aluminum captures the entire market and that total consumption remains static, it would add up to a demand for from 270 to 357 million pounds of aluminum annually. Jim Case believes aluminum can pre-empt half the market within five years, while R. R. Brannon, sales vice president of Anchor Post, thinks aluminum's share could be even higher within that time.

## A Respectable Market

Throw in a handful of ifs and you come up with a respectable tonnage market for aluminum. If their projections prove correct, and if the estimates for steel are anywhere near accurate, and if the demand for chain link remains static, anywhere from 135 to 268 million pounds of aluminum could go into chain link fencing annually by '65.

Getting back down to earth, Jim Case figures the chain link fence business took some 20 million pounds of aluminum this year. This, he says, is a record by a comfortable margin, "and we estimate that 50 million pounds of aluminum will go into fence fabric, pipe, posts and fittings in 1961, assuming any reasonable economy for the nation."

Case calls it "almost a run-away market." And Anchor Post's Bob Brannon quickly adds that it should create a healthy sales potential for independent producers of extrusions, castings, redraw rod and wire.



■ ***Bright dipping, shown being done at Nichols Wire & Aluminum, further enhances sales appeal of aluminum chain link.***

"Anywhere from one-half to two-thirds of the weight of your typical chain link installation is in corner posts, line posts, top rails, gates, and various fittings," Brannon points out. "In aluminum, these things are extrusions and castings. In fact, many a steel chain link job has aluminum components such as caps for corner posts, line posts, etc."

Although Anchor Post buys much of its aluminum from Reynolds Metals Co., Bob Brannon believes that independent fabricators stand a good chance of crashing the market as other chain link fence firms take on aluminum. Jim Case is more specific.

"In many respects, the metal fence business is a regional one," he explains. "As this aluminum trend gains momentum throughout the country, the alert die caster or extruder will get a chance to participate by supplying fittings or posts or rails for jobs in his area."

Most chain link concerns seem unwilling, at present, to express an interest in aluminum. In a spot survey of the industry—both large companies and small—Modern Metals found a generally non-committal attitude toward aluminum, with a few grudging admissions that it occupies a minor role in the business.

A firm in Florida, for example, said that it presently manufactures aluminum chain link, but that the metal accounts for only 1% of its output. A vice president of this medium-sized concern informed us that they buy aluminum wire drawn to size, and weave the fabric on the same machines used for steel.

The company has encountered no difficulty in weaving aluminum fabric — has found, in fact, that aluminum production is faster, hence cheaper. But aluminum fencing still costs more, and this, our informant said, is its main disadvantage. On the plus side he lists "more attractive, longer life, easier to install."

The company is now selling aluminum fencing through 10 dealers, buys its aluminum fittings from outside suppliers, and considers seacoast installations and industrial jobs as the best potential markets for aluminum. Our contact in the company believes aluminum can capture 4% of the market in the next five years, "depending on tariff, duties, and the pricing attitudes of the domestic aluminum industry."

A competitor in Birmingham, Ala., does not manufacture aluminum fencing and has no plans to. Aluminum "has nothing to offer over galvanized steel," says a company vice president, who lists "higher cost" as the metal's main stum-

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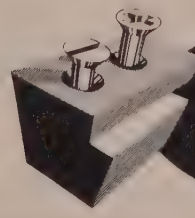

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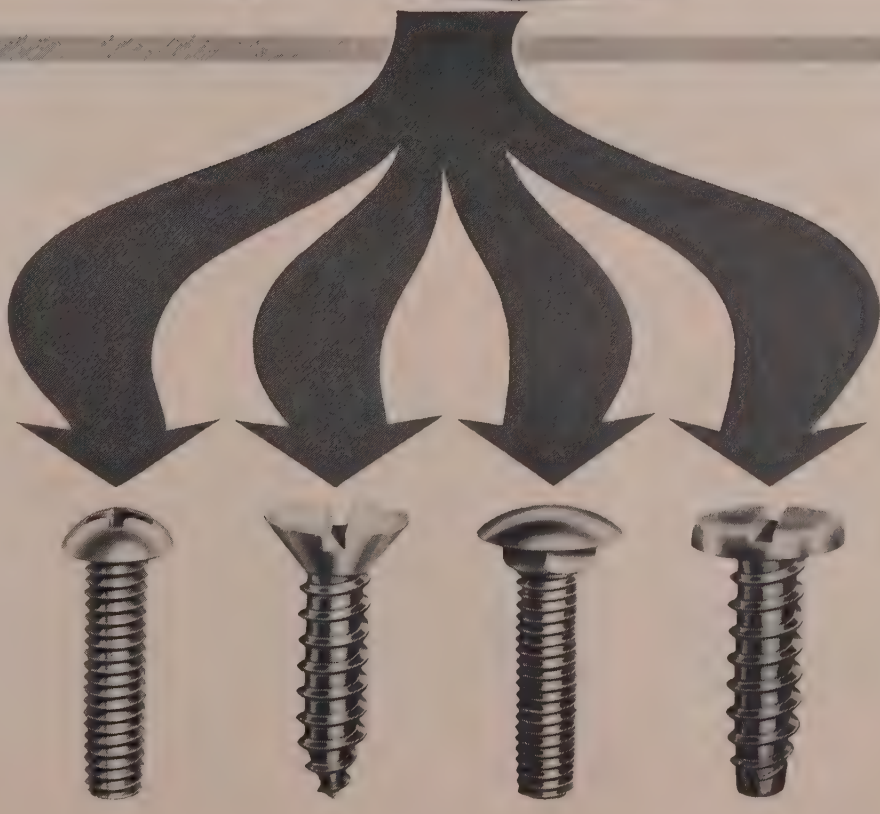

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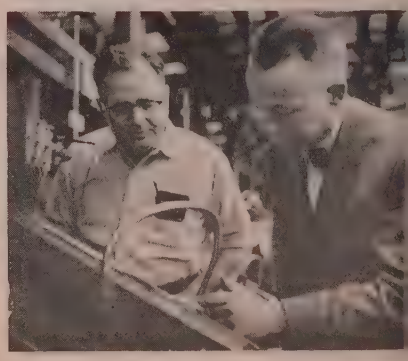

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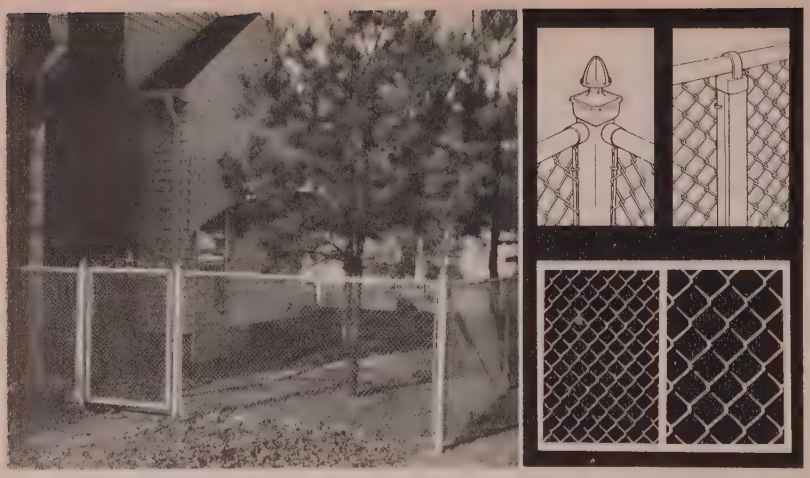


■ *To make chain link fencing more appealing to homeowners, Anchor Post is promoting innovations such as square corner and H-beam line posts (diagrammed top right). Modernmesh is a 1-inch fabric weave (compared in drawing with standard 2-inch weave). Aluminum makes these products still more attractive for homes.*

bling block. Nevertheless, he feels that aluminum can take 5% of the market within five years.

Aluminum accounts for 3% of the volume of a fair-sized chain link company in Ohio, and the sales director of this concern thinks aluminum will take "possibly 20%" of the market by 1965. The company buys drawn wire and weaves it, without trouble, on the same machines used for steel. The product costs about 25% more in aluminum, but the installed cost is 20% higher.

Substation enclosures and highway projects are the largest markets for the company's aluminum fencing. The sales director declined to comment on the most promising growth markets, but did say that he does not consider single family homes a good potential market.

A steel fencing firm in Texas will manufacture aluminum chain link to order, but apparently has no plans to make it a standard product. The manager of this company reports no significant difficulty in weaving aluminum on his equipment, although he had to add a butt welder to the line. He considers aluminum chain link 2½ times as costly to make as the steel product.

Coastal installations and some chemical plants are the largest markets for aluminum chain link, he says, and these, plus the highway program, are the most promising growth markets. He lists light weight, smoothness, and "rust-proof in areas where zinc may be attacked by chemicals," as the chief advantages of aluminum in fencing, and sees cost as the big disadvantage.

Continental Steel Corp., one of the larger companies in the business, produces only galvanized steel chain link fencing at present. "We are interested in aluminum chain link fencing, but have not yet entered into this field, either as a fabricator or a distributor," said one of Continental's sales managers. "However, indications are that aluminum will be given very serious consideration very shortly."

Anchor Post, as noted earlier, has entered the aluminum end of the business in a big way. The company weaves aluminum fabric on machines normally used for steel. Bob Brannon reports that aluminum weaving is 50% slower than steel at present—"mainly because of increased breakage during weaving"—but he's confident that the problems will be licked.

The manufactured cost of aluminum is about 30% higher than that of steel, he says, but the installed cost is only 15 to 25% higher. Although aluminum fencing weighs about 60% less than steel, Brannon sees no significant savings in shipping or installation. The crucial advantages of aluminum over galvanized are its resistance to corrosion and its appearance, he declares.

Anchor Post sold its aluminum chain link through 15 branch offices in 1960; plans to extend this sales coverage to 45 branches in '61. Brannon considers utilities, highways, and municipal and state projects as the largest markets for aluminum fencing at present. The most promising growth markets, in his opinion, are residences and industrial plants.

With its extensive sales network (45 sales and erection offices in 27 states and the District of Columbia), the company is in a strong position to introduce aluminum chain link in virtually every major marketing area in the U.S. This alone will put the pressure on other chain link firms to add a line of aluminum fencing, says Jim Case.

The reason: "In this business you have to match the quality line. And whether the steel companies like it or not, the top quality chain link fence today is aluminum."

The quality of aluminum fencing is fortified by fundamental improvements in fabric, fittings and finish. In its aluminum line, for example, Anchor Post is putting a potent promotional push behind is new Modernmesh—a 1-inch link fabric that gives residential jobs a "lacy look" calculated to appeal to housewives (see photo).

Other firms, notably Nichols Wire, are producing the 1-inch link fabric, as well. It is also made in steel, but problems arise during galvanizing.

Another quality touch is the square corner post and H-beam line post. Together with Modernmesh, these posts remove the "institution" stigma from residential installations (see photo).

Refinements in finish can enhance the appearance of both residential and commercial jobs. Bright Dipping now used by Nichols and being installed by Anchor, gives aluminum an almost elegant look for residential fences.

Green Alodine, a conversion coating process by Amchem Products, Inc., Ambler, Pa., gives aluminum fencing a soft green hue which blends with the surrounding foliage. It also reduces glare and improves aluminum's corrosion resistance.

Following several successful substation jobs, Chain Link Fence Co. of Pennsylvania wrote the Green Alodine process into its specifications; has subsequently sold several residential and industrial jobs.

### 'Let's Keep It Profitable'

Case points out that of the 30-odd companies that weave link fabric, about 20 comprise the hard core of the industry. Altogether, they have the country blanketed with dealer-erector sales organizations—10-12,000 strong—of the type needed to make a go of it in the fence field.

So there's no need for the aluminum producers to try to jump into the business of selling chain link fences, according to Case. The sales apparatus is in existence, and a market is developing fast for a large tonnage of aluminum wire, rod, extrusions, pipe and castings.

The key to the growth of the market, says Case, is profitability—"the ability of the whole aluminum industry, from prime producers to fabricators and erectors, to keep its collective head." Case is confident this will happen.

"The effect of Anchor Post's national drive, its profit-oriented sales program in behalf of aluminum chain link, shows up most clearly in the sharp upturn in sales this year," he points out. "Lacking that old negative pressure of having a steel mill staring down your throat, Anchor took off with the ball. And all of us will have to learn something from the Anchor leadership if we are to keep pace with inevitable growth of the aluminum chain link fence market."

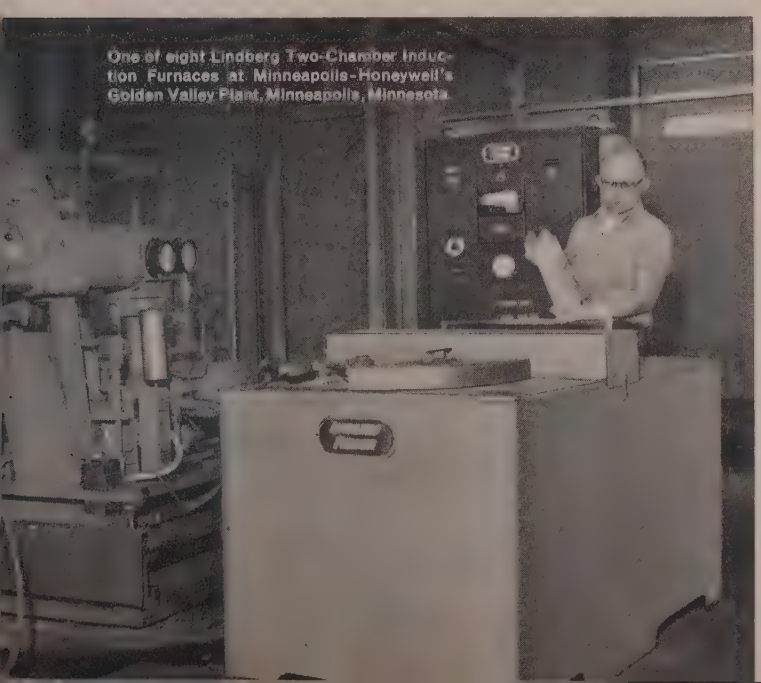
# ART GEORGE has a good word to say for Lindberg Melting Furnace performance

QUOTE

*Mr. Art George, Senior Production Engineer, Golden Valley Plant, Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.*

"Our installation of eight* Lindberg-Fisher Two-Chamber Induction Melting and Holding Furnaces has given remarkable service for more than four years. In this period, with the help of a well executed Honeywell maintenance program, the installation has been unusually trouble-free. Only one of the eight furnaces has required relining over this long period. Handling more than 1,000,000 pounds of aluminum and zinc annually, the installation has unfailingly provided the consistently high quality of metal our precision instruments require."

**Altogether, 44 Lindberg Furnaces are in operation in various Honeywell plants.*



One of eight Lindberg Two-Chamber Induction Furnaces at Minneapolis-Honeywell's Golden Valley Plant, Minneapolis, Minnesota

These eight Lindberg-Fisher Induction Furnaces melt and hold aluminum and zinc for die casting gas valve housings and other component parts. They are located at the die casting machines where ingot and scrap can be melted and held at the desired casting temperature in one convenient unit. Magnetic fluxing and stirring insures uniform temperatures and consistently clean metal.

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*Los Angeles plant: 11937 S. Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg Ltd., 15 Pelham Ave., Toronto 9, Ont. Also, Lindberg plants in Argentina, Australia, England, France, Italy, Japan, South Africa, Spain, Switzerland and West Germany.*

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# EXTRUSION PULLER

- ***cuts manhours***
- ***speeds operation***
- ***improves finish***
- ***reduces scrap***

A NEW extrusion puller designed to operate with up to 6-hole dies is being marketed by Permanent Products Sales Co., 4044 W. 13 Mile Rd., Royal Oak, Mich. The device is made by Permanent Mold Die Co., Inc., Warren, Mich.

The term "extrusion puller" is actually a misnomer, according to F. M. McCann of Permanent Products. "The extrusions aren't pulled, but guided with a constant tension."

Designs have been completed for a puller to operate with up to six hole extrusion dies. Such a unit will be capable of handling from one to six extrusions.

"For instance," McCann said, "if a three-hole die is in the press, only three of the six gripper jaws will operate; the remaining three jaws will be disconnected from the track. Changing the grippers for any number of die holes takes five minutes at the most. In most cases a change can be made in less time."

Two pullers that have been in operation for a total of five years (at Light Metals Corp., Grand Rapids, Mich., and at Superior Industries, Youngstown, Ohio) are designed to operate with run-out tables about 70 feet long. The present design can be adapted to operate with run-out lengths to more than 150 feet, depending on extrusion needs.

"Even though the total run-out length affects the price of the puller, the greater effect, by far, is the number of individual extrusions the puller will be required to handle at one time," McCann explained.

"Each gripper is driven by its own motor, and the speed of each carrier is individually controlled. An extruder who is extruding only four-hole would be penalizing himself, pricewise, if he installed a puller to operate with dies of more than four holes. However, the design is versatile enough to allow the extruder to add to the installed unit should he later decide to go to, say, five- or six-hole dies."

McCann said that at present the puller operates semi-automatically. As the extrusions emerge from the die and canister they are gripped automatically. As each extrusion is gripped, the drive motor for that puller starts up; a continuous cable attached to each gripper carrier is put into motion by its drive motor and in turn, the carrier assembly is put in motion down the run-out table.

Each carrier must be individually driven and controlled since the extrusions will not necessarily have the same run-out speed. Constant tension is kept on each extrusion, independent of the difference in run-out speed, by use of a specially designed magnetic clutch-brake arrangement which is controlled by the amount of force the extrusion exerts on the carrier assembly.

When each extrusion completes its run-out and the press begins to recycle, the force exerted by the extrusions on the carriers is zero. This causes the carriers to stop automatically.

At this point the spring loaded gripper jaws are manually reset. This frees the extrusions, and the carriers continue their travel to the end of the run-out table. Since the jaws must be manually reset, an operator is required at the end of the run-out table.

While the next billet is being loaded into the container, the press operator pushes the return on the press pulpit. This reverses the drive motors, and the carriers are returned to the press at about 20 feet per second.

Instead of continuing right up to the face of the canister, the carriers stop about 3 feet away — the distance required for the extrusions to be pulled from the canister after they have been freed from the die by the next billet. After the extrusions are freed, the carriers continue the travel to the face of the canister to grip the next extrusions, thus completing the cycle.

The biggest advantage of the puller is that it will reduce the number of men needed along the run-out table from three, or two, depending on whether 6-hole or 4-hole dies are in use, to one man at the end of the table.

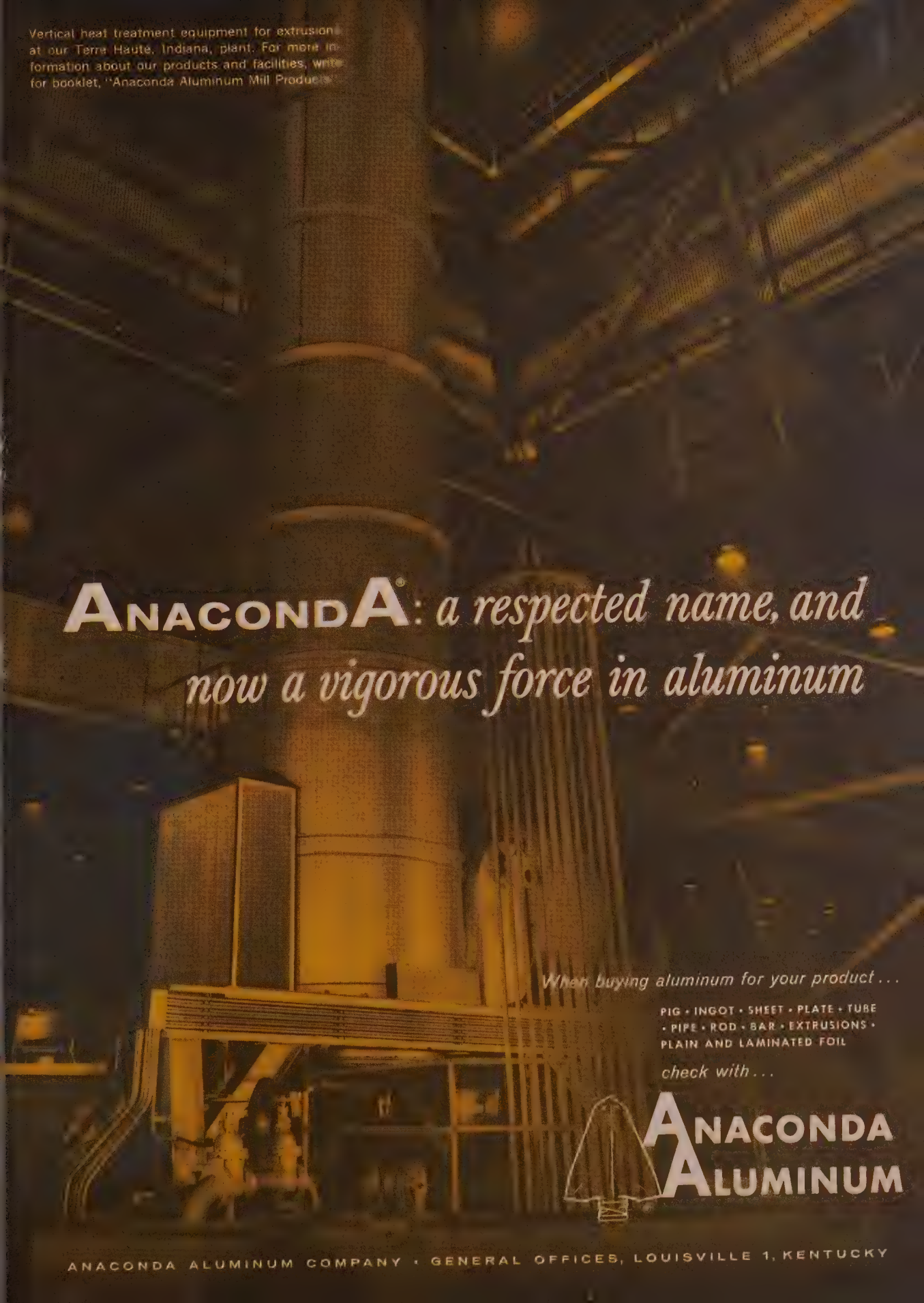
Aside from direct labor savings, the puller has other advantages:

1. Press speed can be increased because the puller can return to the press faster than a man, thus reducing dead cycle time. The longer the run-out distance, the more important this is.
2. With many sections the finish will be improved because each extrusion is guided with constant tension along a straight line.
3. Improved finish reduces scrap.
4. Less die correction will be needed, since difference in run-out has no effect on the puller function.

P. M. D. has also designed a walking beam run-out table which moves the extrusions to the stretcher and serves as a cooling rack. The company also makes specially designed canisters which, in most cases, will be required with an extrusion puller installation.

The company is considering the possibility of designing a puller for 7- and 8-hole dies, too.

■ ***Extrusion puller on the job at Superior Industries, Youngstown, Ohio, is shown handling four extrusions (note difference in run-out lengths). Carrier track here is ceiling-suspended, but cantilever support could be used if needed. Drive motors and control panel are located at end of run-out table. Canisters are also shown.***



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# Welding Aluminum

## Part 8: Pre- and Post-Weld Operations

***This segment of Welding Aluminum series details edge preparation, joint spacing, mechanical and chemical cleaning, flux removal, use of jigs, fixtures and tack welding, etc. To be detailed next month —supervision and training of weldors, and safe welding practices.***

**Based on information supplied by Aluminium Laboratories Limited, Research Division of Aluminium Limited**

PREPARING aluminum and its alloys for joining by the various fusion welding and brazing processes usually entails joint selection, edge preparation, cleaning of joint area, spacing, jigging, and in some cases preheating.

These operations, to be detailed here, are common to all the joining processes, and proper attention to them speeds welding and helps ensure quality joints.

Five basic types of joints are shown in Figure 1. Whether or not edge preparation will be needed depends on the circumstances under which they are used. In practice, many variations and combinations of these types of joints are encountered.

Edge preparation is governed largely by alloy, metal thickness, type and location of joint, welding process used and weld quality required. Methods of edge preparation include shearing, sawing, chipping, planing and routing. To obtain optimum results, these operations sometimes must be followed by hand dressing with or without power tools.

Shearing of aluminum sheets, plates and shapes less than ¼-inch thick may be done with ordinary sharp-bladed shears. No further edge dressing is usually necessary except when seeking the highest quality weld. Material ¼-inch or thicker may also be sheared, but more edge dressing is usually required to facilitate fit-up and welding.

Aluminum can also be easily cut by hacksaws, band, jig, and circular saws. Correct blades, speeds and feeds can make fast accurate cuts, which, if clean, need no further dressing.

Band saws are perhaps the most versatile for cutting aluminum. They should be of the wood-working type, strong, and capable of high-speed operation. A tilting table is necessary for effective band-saw edge preparation.

The type of band saw blade for cutting various alloys, tempers and thicknesses should be recommended by the manufacturer. Usually band saw blades have alternate set, skip, buttress or saber type teeth at a spacing of two to four teeth per inch. Blade speed must be at least 5000 fpm. under full load.

### Keep Tools in Good Shape

Keep blade guides in good condition and properly adjusted, and blade joints sound and ground flush. Feed should be great enough to keep the saw cutting at all times. This reduces the amount of heat generated and increases blade life. Use a stick wax lubricant. Where a coolant and lubricant are required, use a soluble oil solution.

Use portable electric jig saws to cut holes and scrolls in aluminum when band saws aren't available or practical. The saw manufacturer can recommend type and size of blade.

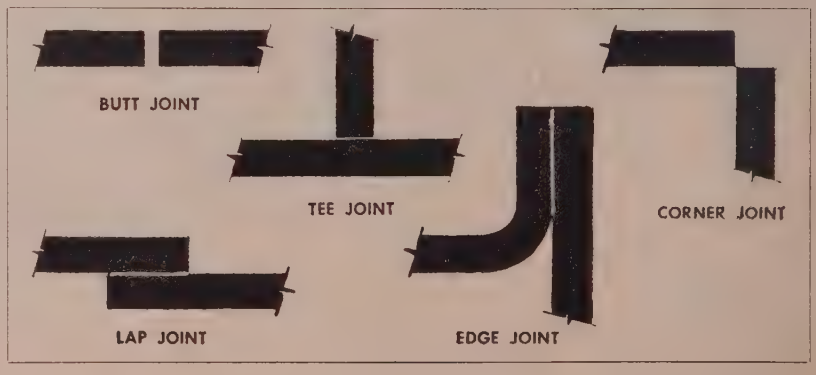
Circular saws with blade speeds of over 8000 fpm produce excellent cuts in aluminum. Use hollow ground blades, kept sharp and in good condition. Portable electric or air-driven saws, similar to wood saws, are popular. Here, too, use a lubricant.

For heavy, continuous sawing, a coolant (soluble oil solution is best) applied freely will speed sawing and increase blade life. Where necessary, mineral or lard oil, etc., can be used, but metal must then be degreased.

Chipping with pneumatic tools is an effective, but slow, means of edge preparation. It is used extensively for back chipping welds and for removing defective areas prior to re-welding. Chipping is the preferred method since the form of the chip coming off the tool indicates when sound metal has been reached. The cutting edge of the chipping tool should have a larger rake angle than that for steel.

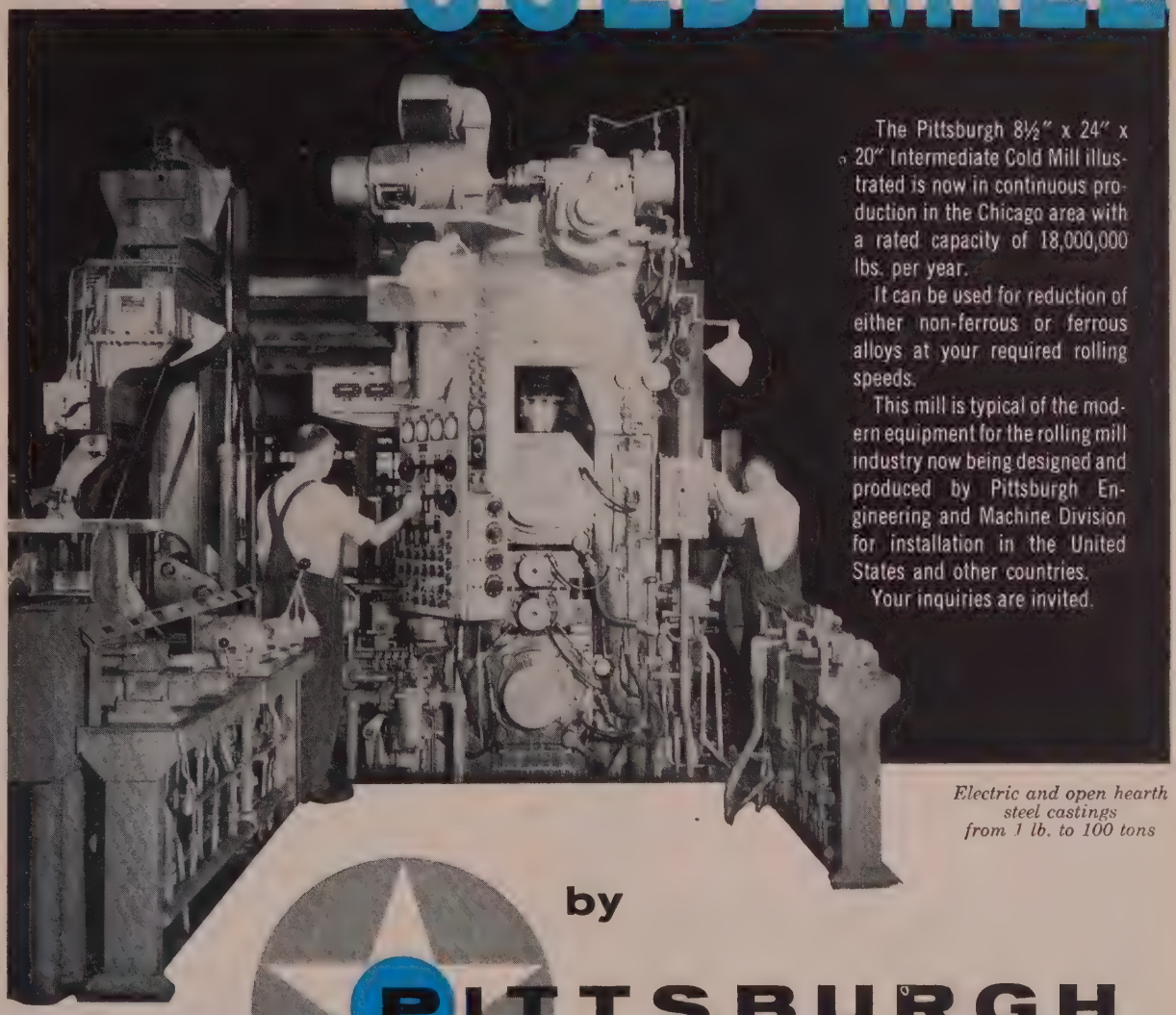
Rotary planers may be used for edge preparation. For large, thick plates, use a high speed, motor-driven tool, ground

## Fig. 1: Five Basic Joint Designs



# 4 High Non-Reversing

# COLD MILL



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## TABLE 1: Preparing Aluminum for Welding

| METHODS AND CONDITIONS | REMARKS |
|---|---|
| *Hand wiping* with clean rags. | Applicable to all alloys for welding. |
| *Degreasing* with commercial solvents by wiping, spraying or dipping, and vapor degreasing. | Removes oil, grease, dirt and loose particles. Applicable to all alloys for all welding and brazing processes. |
| *Mechanical Oxide removal* by wire brushing, filing, milling, rubbing with steel wool, sanding, routing, rotary planing. | Sufficient treatment where edges are not oxidized too heavily. Applicable to all alloys for fusion welding but not usually employed for resistance welding. |
| *Chemical surface treatment* by immersion in 50% solution of concentrated nitric acid at room temperature for 15 minutes followed by cold water then hot water rinse and drying. | For removing thin oxide film for all fusion welding processes. |
| *Chemical oxide removal* by immersion in 5% Sodium Hydroxide (caustic soda) solution at 160°F for 10-60 seconds, followed by cold water rinse, followed by rinse in concentrated nitric acid at room temperature for 30 seconds followed by a cold water then hot water rinse and drying. | For removing thick oxide film from all alloys for all welding and brazing processes. |
| *Surface treatment* by proprietary products. | Consult supplier for uses and recommended procedures. |

to the desired contour. High-speed, portable hand planers, as used on wood and plastics, are very satisfactory for edge preparation, fitting and weld finishing.

High speed routers and edge millers, fitted with tools shaped to give the desired edge contour, produce excellent results on aluminum.

Routers perform the double function of preparing and shaping the joint edges and fixing the joint spacing in one operation, if plates are first positioned. Routers should operate at spindle speeds up to 25,000 rpm.

Cutters should always be sharp, and used with a soluble oil solution lubricant and coolant if tool heating is a problem. Use stops and guides to regulate cut, particularly its depth.

Remember, if a lubricant is used to facilitate edge preparation, it must be removed completely before welding. Therefore, use only the amount of lubricant needed for proper cutting and tool life. Also, the longer the lubricant is left on, the more difficult it is to remove.

### Surface Cleanliness Vital

Cleanliness of the surface to be welded is vital to sound joints, regardless of the welding or brazing process employed. So, aluminum should be carefully stored and handled during fabrication to minimize preweld cleaning.

Don't prime and/or paint aluminum products prior to welding or brazing. These paint films are very tenacious, but they must be removed completely from the joint area before welding.

Immediately prior to welding or brazing, edges and adjacent metal must be freed of grease, oil, dirt and loose particles. This must be done by mechanical or chemical means, since welding and brazing fluxes only remove the oxide film.

Wiping with clean rags will usually remove enough oil, grease and dirt to permit satisfactory welding, but not brazing.

### Mechanical Cleaning

Wire brushing, scraping, filing, rotary planing and sanding are suitable mechanical cleaning methods. They aren't always effective, and are rather costly, but they do have the advantage of being applied only to the area to be welded. Such cleaning can be done with power tools.

Don't let loose abrasive become embedded in the metal because insoluble inclusions will form in the weld. To prevent this, wipe metal with rags prior to cleaning, and keep rags handy so loose abrasive can be brushed away. Also, keep wire brush close during welding so that it can be used between passes to remove any newly formed oxide, etc.

Chemical cleaning methods consist of dipping, spraying or wiping with commercial solvents such as mineral spirits. Trichlorethylene and carbon tetrachloride are good cleaners, but shouldn't be used unless their fumes can be removed completely from the welding shop.

When thickness and uniformity of oxide coating must be adjusted for satisfactory welding and brazing, degreasing is followed by an etching treatment. Suitable alkaline, acid and proprietary solutions are used (see Table 1). Inhibitors, to prevent too strong an attack, are added to these solutions. After chemical cleaning, rinse metal thoroughly with water to remove all traces of the chemicals.

Joint spacing requires careful consideration to ensure good penetration and to help control distortion. The same factors that influence edge preparation affect spacing (see Fig. 2).

### Edge Preparation, Spacing

To prevent cracked weldments in butt joints when welding heat treatable alloys, it is imperative to have correct edge preparation and spacing. These result in welds composed of an alloy of sufficient plasticity or ductility to absorb stresses and avoid cracking.

Welding heat expands the parent metal and may change joint spacing as work progresses. To maintain joint spacing during welding, use jigs, clamps or tack welds. Too much emphasis cannot be placed on the importance of adequate jigging; proper jigs provide quality welds at low cost.

Improvised jigs, using various types of clamps with or without backing strips, can be used for relatively small quantities of welding. However, specially designed jigs are best for quantity production runs, for complicated assemblies, or where precision is necessary. Frequently, parts are designed to be self-jigging, which lessens tooling cost.

When distortion and weld cracking are problems, jigs should be designed to allow for, or resist, expansion and contraction of the aluminum during heating and cooling. The former is accomplished by holding the joint securely but not tight enough to prevent movement. Jigs should also provide for easy handling of work and for quick, accurate alignment of edges to be joined.

### Tack Welding Uses

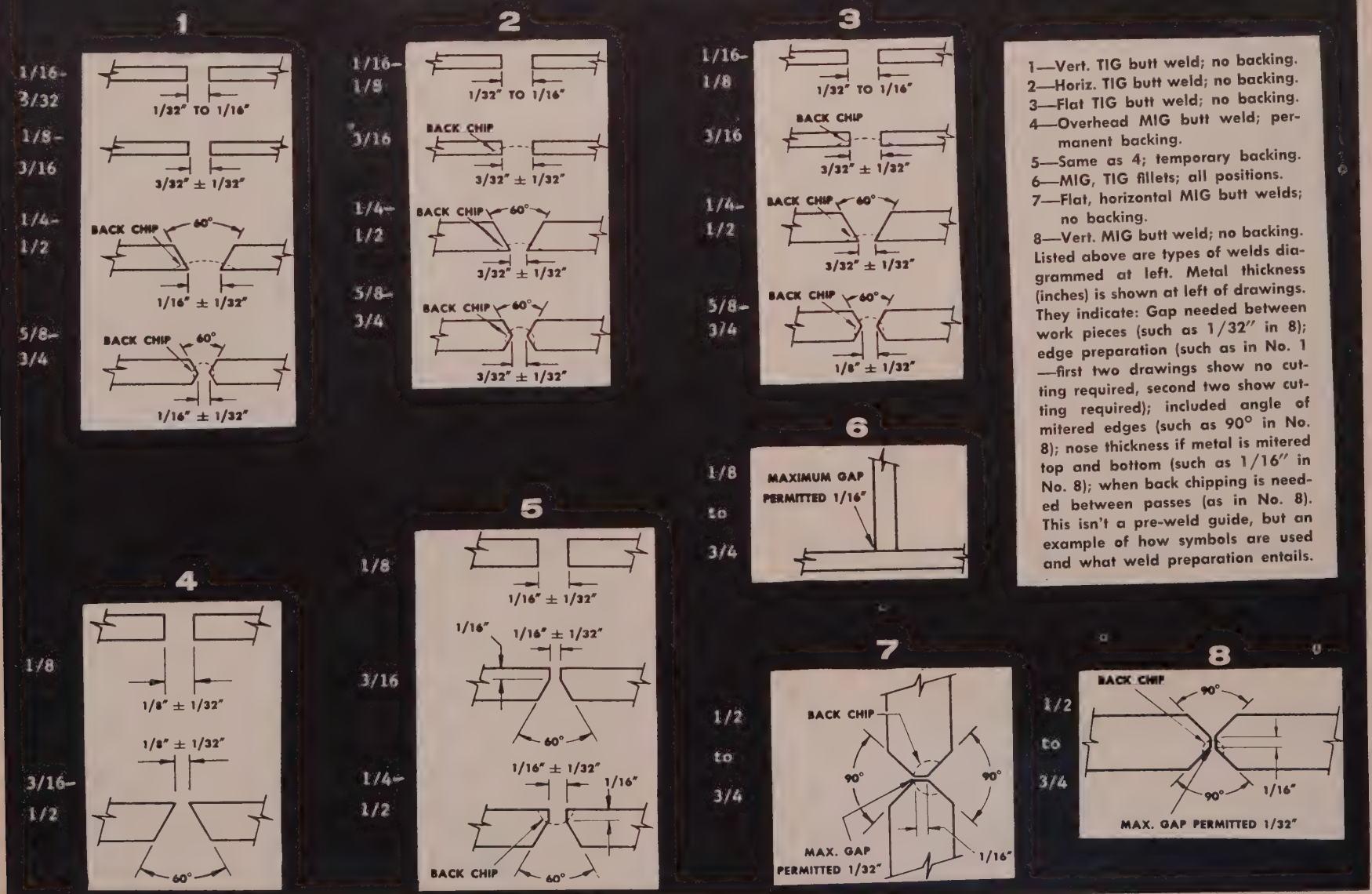
Tack welding is used to hold metal in position when a jig is not warranted. Or sometimes, a jig is used for holding material while it is tacked. The assembly is then taken from the jig and completely welded. In this manner, one jig often serves several weldors. In some cases, both jigging and tacking are required to align and hold assemblies to be joined.

If temporary backing strips (not to be fused to the joint) are used to support a joint, be sure they are grooved or that space is left below the weld. This allows an underbead of metal to protrude below the plane of the bottom surfaces of the components, ensuring adequate penetration.

The groove should be rectangular,

(*Continued on page 42*)

# FIG. 2: Edge Preparation and Joint Spacing For Some Typical MIG and TIG Welds




1—Vert. TIG butt weld; no backing.
2—Horiz. TIG butt weld; no backing.
3—Flat TIG butt weld; no backing.
4—Overhead MIG butt weld; permanent backing.
5—Same as 4; temporary backing.
6—MIG, TIG fillets; all positions.
7—Flat, horizontal MIG butt welds; no backing.
8—Vert. MIG butt weld; no backing.

Listed above are types of welds diagrammed at left. Metal thickness (inches) is shown at left of drawings. They indicate: Gap needed between work pieces (such as 1/32″ in 8); edge preparation (such as in No. 1—first two drawings show no cutting required, second two show cutting required); included angle of mitered edges (such as 90° in No. 8); nose thickness if metal is mitered top and bottom (such as 1/16″ in No. 8); when back chipping is needed between passes (as in No. 8). This isn't a pre-weld guide, but an example of how symbols are used and what weld preparation entails.

shallow (0.010 to 0.030 inch), and wide enough so that it does not confine the edges of the penetrating bead. Too wide a groove will not give sufficient support to the metal under the hold-down clamps.

Aluminum is usually the most suitable backing material, but stainless steel is used when less thermal conductivity in the backing strip is required. Don't use magnetic material such as steel with any electric welding process.

### Backing Strips — Good and Bad

The chilling effect of the clamping strips may be advantageous at times, but it may also be a distinct disadvantage. If so, place asbestos paper between the backing strips, clamps, etc., to insulate them from the work.

Be sure the asbestos paper is not placed directly beneath the joint. Also, by placing strips of asbestos paper under and just back from the edges of the material, a groove is formed which allows for good penetration, so one isn't needed in the backing strip.

All electric or arc welding processes are susceptible to arc instability when any magnetic material is in the vicinity of the arc. Magnetic material should not be used on those parts of jigs, fixtures, or backing within 2 inches (preferably 4 inches) of the arc. Aluminum and stainless steel, both non-magnetic, can be used for parts of jigs near the arc.

The extent of preheating depends upon the welding process, parent alloy, thickness of metal, nature of structure, and the ambient temperature. Preheating is carried out best in suitable industrial furnaces, but a torch may be used by experienced personnel. It should be done carefully to obtain uniform heating and to avoid overheating.

Careful preheating reduces distortion; improper preheating and/or cooling may result in excessive distortion, high stresses, and loss of mechanical properties. Preheating of heat treated materials, especially castings, usually necessitates reheat treatment after welding.

Pyrometric instruments are best for indicating when the proper pre-heating temperature is reached, but temperature indicating paints or crayons may be used.

In TIG (tungsten-inert-gas) and MIG (metal-inert-gas) welding, pre-heating is used when the temperature of the work falls below 15° F, or when welding thick material, particularly over ½ inch thick.

In such cases, preheat to approximately 200° F, not because of metallurgical considerations, but as a convenience to welding. It permits adequate penetration on weld starts without readjustment of current as welding progresses.

In metal arc welding, preheating is used to enhance weld quality.

### Preheat When Gas Welding

Preheating is always necessary in oxy-gas welding. In lighter gauges it is done with the welding torch, but for thicker gauges a separate heat source is generally used. For non-heat treatable wrought alloys, keep preheating temperature below 750°F while for the heat treatable wrought alloys, 400°F is maximum.

Preheat large or intricate castings to approximately 800°F to avoid thermal stresses and to facilitate development of the temperature required for welding. After welding, cool castings slowly to minimize risk of cracking.

Castings required in heat treated condition should be welded prior to heat treatment or should be reheat treated after welding. Also, preheating and the heat of welding may affect the corrosion resistance of some alloys, such as 220, unless welding is followed by heat treatment.

### MIG, TIG Welds Are Clean

MIG or TIG welds do not need finishing, except when a smooth appearance is required. Occasionally it is necessary to finish welds to facilitate fit-up.

The flux required by some processes is a potential source of corrosion, especially between faying surfaces. Be sure to remove it.

Flux used for metal arc welding is not as corrosive as that used for oxy-gas welding. Brazing fluxes are the most corrosive. To remove flux residue, immerse the weld in boiling water, and scrub vigorously with a fiber brush. Successive rinsing can be carried out in counter-current dipping rinse and wash tanks.

For large assemblies, it may be possible to clean with a jet of steam and hot water. Particular attention should be given to crevices, sharp corners in the inside of small tanks and castings. For assemblies with inaccessible joints but for which complete removal of the residue is necessary, use a chemical dip after the boiling water washing and rinsing operations (see Table 2).

All acid solution treated metal must be thoroughly rinsed in hot and/or cold water and dried. If the rinsing water is inclined to be corrosive or to cause staining, add a small amount (1% by weight) of sodium or potassium dichromate. Dry the metal as fast as possible. A warm air blast will speed drying and minimize staining.

Visual examination is usually sufficient to determine whether the flux has been removed completely, but the following chemical test may be used:

### For Chemical Test . . .

Apply a few drops of distilled water to the weld area where the presence of flux is suspected. After several minutes, collect a few drops and add them to a 2% solution of silver nitrate, acidified with a few drops of nitric acid. In some cases, it may be easier to add the silver nitrate solution to the solution covering the test area of the weld. In either case, the solution will turn milky if flux is present. Further washing is then necessary until a colorless test is obtained.

Finishing of weldments is often necessary in food handling and chemical equipment and applications where ap-

## TABLE 2: Chemical Solutions for Flux Removal

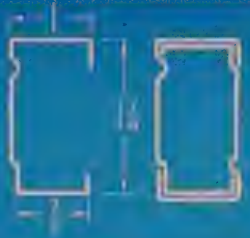
| SOLUTION | CONCENTRATION | SOLUTION OPERATING TEMPERATURE | IMMERSION TIME (MIN.) | RINSE |
|---|---|---|---|---|
| *Nitric acid (conc. technical grade)* | 50% | room | 10-20 | in cold water, then rinse in hot water, then dry |
| *Water* | 50% | | | |
| *Nitric acid (conc. technical grade)* | 15% | | 5-10 | Rinse in hot water, then dry |
| *Sodium dichromate ($Na_2Cr_2O_7$)* | 10% | 150°F | | |
| *Water* | 75% | | | |
| *Nitric acid (conc. technical grade)* | 10.0% | room | 10-15 | in cold water, then in hot water, then dry |
| *Hydrofluoric acid (conc. technical grade)* | 0.7% | | | |
| *Water* | 89.3% | | | |

**PART:** Stiffener for display shelving. Same set of rolls makes both large section (front shelf edge and price moulding) and hat section (middle and back reinforcement).

**MATERIAL:** CRS 22 ga. (.0296″).

**STOCK WIDTH:** Large section, 7⅛″; hat section, 4¼″.

**SPEED:** 65-90 fpm.



**PART:** Awning structural support. Used as single members or assembled as a box.

**MATERIAL:** .051″ Aluminum and CRS.

**STOCK WIDTH:** 4″.

**SPEED:** Approximately, 65 fpm.

**PART:** Slats for home motion picture screens. Two sizes, run continuously with automatic cut-off.

**MATERIAL:** 24 ga. CRS, pickled and oiled.

**STOCK WIDTH:** 2.875″ for ⅛″ diam. tube; 2.500″ for ¼″ tube.

**SPEED:** 60-90 fpm. depending on lengths cut off.

**PART:** Table slide hardware, telescoping sections.

**MATERIAL:** 18-20 ga. CRS (.045″ and lighter).

**STOCK WIDTH:** Outer, 2¼″(run on machine auxiliary side); inner, 2″ (run on inboard side).

**SPEED:** 90-95 fpm.

**PART:** Sign and display backframe. Formed section serves as hinge for access to electrical parts.

**MATERIAL:** 20 ga. CRS.

**STOCK WIDTH:** (Sheet edge operation).

**SPEED:** 60-65 fpm.

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**MIG WELDING—applications; equipment; filler alloy; adjusting arc; torch manipulation; trouble shooting.**

**MIG vs. TIG—relative cost, versatility, weld quality, etc. of these two main aluminum welding processes.**

**RESISTANCE WELDING—types of machines, electrodes, cleaning methods, etc. for spot, seam, flash welding.**

**OXY-GAS & METAL ARC METHODS—how to choose flux, filler etc.; jigging; flame control; current control, etc.**

**BRAZING—when and how to use torch, dip and furnace brazing on aluminum.**

**PRE- AND POST-WELD OPERATIONS—full details on joint design; cleaning, etc. (see article, page 38, this issue).**

**SUPERVISION AND SAFETY—how to train and supervise your welding personnel.**

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pearance is important. Mechanical means consist of chipping, filing, planing, grinding, and in some cases, peening. Use power driven grinders and belt or disc sanders for large quantities of work. A lubricant — kerosene or stove oil — facilitates grinding with belt or disc sanders by preventing the aluminum from loading the abrasive.

Filing is slow, but sometimes the weld cannot be finished any other way. Special files, such as auto body files which do not load up, produce excellent results on aluminum, as do portable electric or air-driven planers similar to those used on wood.

### Try Grinding, Polishing

Rough and fine grinding or polishing are done on cloth wheels with the aid of suitable abrasives. Scratch or wire brushing also improves weld area appearance.

Aluminum weldments may also be finished by chemical or electro-chemical means to provide additional protection from corrosion or to form the basis for a decorative finish. Aluminum weldments to be anodized for decorative work should be made with recommended filler materials so as uniform a color as possible will be obtained throughout the weld area.

Aluminum weldments may be painted after cleaning. The recommended paint system on aluminum should consist of a coat of wash primer conforming to U. S. Mil. Spec. MIL-P-15328, or a zinc chromate primer conforming to Canadian Gov. Spec. 1-GP-46-1946 or U. S. Mil. Spec. MIL-P-6889.

Almost any good finishing coat paint is suitable, provided it is compatible with the primer. Aluminum paint is an excellent finish because of its durability, opacity and impermeability; also, breaks in the paint film are hardly noticeable since the exposed metal is the same color.

### Weld Heat Can Affect Metal

Heat treatable alloys such as 6063 and 6061 have their mechanical properties reduced somewhat by the heat of welding. If this loss of strength cannot be compensated for in the design of the structure, the assembly can be reheat treated after welding if size of parts permits.

Metal can be treated in air or salt bath furnaces heated to the solution heat treatment temperature needed for the particular alloy. After quenching, the parts may be precipitation heat treated if required.

Heat treatment requires precise temperature control and a knowledge of metallurgy. Therefore, be sure to use proper equipment and trained personnel.

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# *Butler Boosts Aluminum In Prefabricated Building Business*

***Until five years ago, a leading manufacturer of metal buildings was using steel almost exclusively. Today, aluminum accounts for a big portion of its business.***

**by W. L. Smith, Vice President engineering and production, Butler Mfg. Co., Kansas City, Mo.**

ONE WORD indicates the growing importance of aluminum in the operations of Butler Manufacturing Co., one of the leading producers of pre-engineered metal buildings. That word is "metal."

Although the company has been making buildings since 1908, its corporate reputation has been built on the term "steel buildings." About five years ago, the company recognized the increased importance of aluminum in construction and changed the word "steel" to "metal" in all its advertising, promotion and correspondence.

In addition, the Steel Buildings Division, which was established in 1941, was changed to simply Buildings Division. This was prompted, not only by the company's increased use of aluminum, but also as a result of its decision to produce and market plastic building panels.

Butler's aluminum story began during World War II when the Kansas City-based firm, along with other light and heavy industries, was called upon to supply various structures for the armed forces. Butler provided such diverse structures as military barracks, task force buildings, combat hangers, pump houses and training buildings.

During World War II, Butler produced 90% of all the prefabricated steel hangers shipped overseas to the army and navy. This represented a whopping 21 million square feet.

The wartime demand for steel on the part of many firms, large and small, nearly drained the nation's total output of steel. This shortage, in turn, gave rise to the use of aluminum in countless areas where only steel had been used.

Butler was no exception. The company geared for the use of aluminum panels on the walls and roofs of its pre-designed buildings, and aluminum has been in the picture as a metal building component since that time.

## Aluminum Usage Increasing

In the late 1940's and early 50's, when steel was no longer in short supply, aluminum consumption declined at Butler. However, more recently aluminum has regained its position as a top item in Butler's production.

Butler customers recognize some of the advantages of aluminum—minimum maintenance, lighter weight and the pleasing appearance created by embossing. The aluminum industry also made important inroads in our field by being the first metals supplier to offer color to the customer. This continual upgrading of aluminum apparently appeals to customers who are willing to pay a premium for beauty as well as function in planning their new buildings.

Butler uses aluminum in a variety of ways:

**Building Panels.** In 1959, the company introduced two new building panels at a national sales conference in St. Louis — Butlerib and Monopanl. Butlerib, a sturdy panel with unique configurations, is now the standard covering for the complete line of more than 1000 pre-engineered Butler buildings.

Butlerib panels are made in both aluminum and galvanized. Aluminum panels are fabricated from coils 44 inches wide and weighing 4000 to 6000 pounds. The coils are loaded on a hydraulic uncoiling spindle and are fed into an 18-stand roll forming mill. The mill forms the flat aluminum into the Butlerib Panel. A flying cut-off cuts the panel to the desired length.

The cut panel moves along the transfer belt to the automatic stacking machine where it is uniformly and neatly stacked. This stack is then moved by power conveyor onto a transfer car, which can travel the entire length of

■ *St. Bernadette Catholic Church in Albuquerque, New Mexico. All sidewall material above the masonry wainscoat, as well as the roof is constructed of aluminum Butlerib. At right, Butlerib panels are shown on storage conveyor.*

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■ *Completed outside face of Monopanl comes from 14-stand roll forming machine (above). Piece is fastened to inside slab of panel (which has already been given a slab of fiberglas insulation) and stacked for packaging (below).*

the building, until the stack is aligned with one of the many conveyors which carries it directly to the packaging area or to a subsequent fabricating operation.

Other operations performed on the panels include notching on wall panels, inverting on gable panels and ridge forming on ridge panels. These panels are again moved onto the transfer car and carried to the desired conveyor in the packaging area. When in this area, all panels are packaged and loaded onto wagons for transfer to the shipping department.

Monopanl is a single assembly metal panel with fiberglas insulation sandwiched between exterior and interior faces. The two faces are roll-formed separately, in order to accommodate numerous combinations of configurations, weights, thicknesses and colors.

To produce the inside face, a coil weighing 1100 to 2500 pounds is loaded onto a hydraulically-operated uncoiling spindle. The coil is then fed into a rolling shear which cuts the width from 16-5/8 to 14-5/8 inches, which serves to square the panel.

## 12-Stand Mill Rolls Inside

The coil is then fed into a 12-stand rolling mill where it is given inside face contour. After roll-forming, it passes through the fly press and die where it is cut to the desired length.

The inside face then continues down the contour slide where insulation is dropped in, then onto a cross conveyor to await the fastening operation.

The outside face travels through the same operation, but the starting width is 11-11-16 inches and is cut to 17-11-32 inches. The outside face mill is a 14-stand machine. No insulation is added to the outside face.

When both panels have reached the fastening machine, they are fed through the machine where a vinyl strip is placed between meeting surfaces before fastened together. The panels then continue down another runout table to another cross conveyor where they are ejected. The end cap is fastened in place, after which the completed panels are stacked and moved to packaging.

## Monopanl — Pretty, Useful

Monopanl has proved popular for both industrial and commercial use because of its aesthetic and functional qualities. One or both of the Monpanl faces are available in various aluminum thicknesses, ranging from .032 to .050 inch and in a variety of colors.

Aluminum sash is manufactured specifically for Monopanl and is easily installed. Extruded headers and sills produce a weathertight closure on adjoining Monopanls and sash elements simply drop into place as the wall is constructed.

Early in 1961, the company will introduce its new Modular Wall System, a curtain wall designed for one and two-story structures and distinguished by its structural simplicity. Aluminum will play an important role in this wall system, with both exterior and interior finish faces being .032 inch aluminum in a hammered-embossed texture and finished in a selection of durable colors.

The aluminum for this system will be rollcoat-painted with colored vinyl or acrylic enamel, following cleaning and conversion coating in a standard pretreatment line.

Extruded aluminum trim is used for the closure between the panels and the soffitt if there is a roof overhang. Sill flashings are factory-formed of mill finish aluminum, and aluminum glazing bead extrusions are furnished for aluminum doors and are available for windows in the wall system.

For a number of years, the most popular aluminum application in Butler Buildings has been roof panels, again because of minimum maintenance, their rust-free qualities and general appearance. In 1960, after years of testing and experience, Butler scored a "first" in the metal buildings field by offering a 20-year guarantee on aluminum roofs.

## Guarantee — A Sales Extra

The guarantee also is the industry's answer to the "bonded roof." This optional guarantee, available at a small additional cost, has proved an outstanding sales "extra" in the marketing of Butler Buildings.

Outstanding examples of the use of aluminum on Butler Buildings obviously must include the 5½-acre aluminum roof on the building for Flick-Reedy Corporation in Bensenville, Illinois. This industrial masterpiece was named one of the nation's "Top Ten" by *Factory* last year, and reportedly is the first pre-engineered metal building to win this award.

Another noteworthy example is a group of ten buildings recently erected in the southeast U.S. for a leading tobacco processor (some 330,000 square feet of warehouse space are being completely-enclosed with Butler's hammered-embossed aluminum panels).

Aluminum has also been used, and is being used, on scores of Butler Buildings housing food stores, churches and schools, bowling lanes, manufacturing operations, wholesale and retail outlets and warehouse facilities.

Aluminum Monopanl also is being sold in increasing quantities for use as a decorative material on masonry.

## Four Plants Make Components

At present metal buildings are being produced at four of Butler's plants — in Galesburg, Ill.; Birmingham, Ala.; Richmond, Calif.; and Burlington, Ontario, Canada. Butlerib is fabricated at most of these plants. At the present time, all Monopanl is produced at the Galesburg facilities. The Modular Wall System is being fabricated initially only at the company's home office plant in Kansas City.

The Building Division consumed more aluminum during 1959 than was used in 1957 and 1958 combined. While no figures are available for 1960, all indications point to a steady increase in the use of this light metal. Butler's success with, and increased application of aluminum suggests that it has a very bright future in the programming of the nation's pre-engineered metal buildings industry.

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# WEBCOR cashes in on a

## *complete extrusion service*

An extruder who likes to finish his work has proved a boon to major manufacturer of electronic recording devices. Webcor units make extensive use of extruded and other aluminum parts—mostly supplied by job fabricators.

**by H. K. Darby Associate Editor**

AS ANYBODY will discover who uses one, the new Webcor Royalite II is an outstanding example of modern tape recorders, what with its high fidelity performance, its precise obedience to push-button direction, and its smart design which employs aluminum in extruded and other forms.

While few people will fail to notice the instrument's rugged aluminum construction, most of them would be surprised to know the extent to which Webcor depends on aluminum job fabricators to supply finished components for almost the entire range of their electronic wonders. And while this policy suggests that Webcor is wisely confining itself to the manufacturing operations it knows best, it also implies that it is getting good performance from its suppliers.

The major supplier of aluminum components for the Royalite II is General Extrusions Inc., Youngstown, Ohio. The topflight performance rendered in behalf of the instrument is two-fold: Quality of the work supplied, plus the fact that the General can supply a wide range of fabricating services. This is a great aid to Webcor. The more component finishing done under one roof, the better.

GEI delivers three parts that are all but finished when they leave the Youngstown plant. Following the standard work performed on extrusions in any properly equipped plant, GEI performs such operations as miter cutting, bending, riveting, buffing (hand and machine), chemical polishing, etching, anodizing, drilling, and spray painting.

### Example: Making the Case

The main extruded component is the wrap-around (main frame) for the body. This shape is about 3⅜ inches deep, with a 2-21/32-inch-wide channel. After saw-cutting to 4-foot lengths, the extrusion is punched and perforated to produce openings for output jacks, handle, cover latch, and other opening requirements.

Mitering is the next job. The extrusions' strengthening ribs are notched at the proper places to permit bending. The sections are then hand-bent to produce a square wrap-around with two butting ends which are joined together by riveting to a backing plate (made by General Extrusions, Inc.)

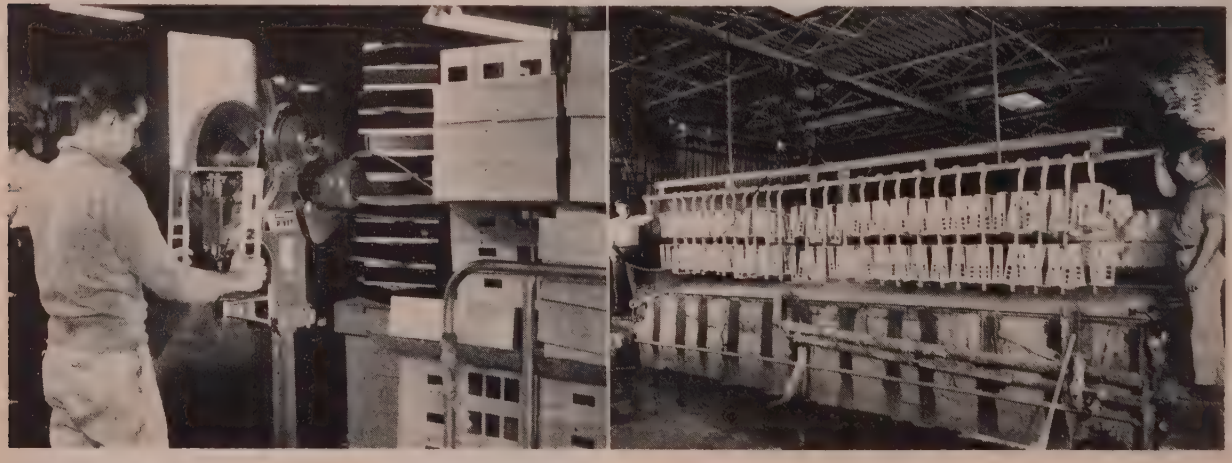
Next steps are etching and anodizing, for 25 minutes, to produce GEI's Generalsatin finish. This removes any minor surface scratches or other defects which occurred in fabrication. It also increases scratch resistance and wards off corrosion.

A narrower extrusion which is sized to fit over the main wrap-around becomes the lid flange. It is given the same etch and anodizing treatment.

Final handling of the wrap-around by GEI involves masking and spray painting just the channel area with a fast drying, black lacquer. When this is done, the wrap-arounds are ready for delivery to Webcor.

The third extrusion is a solid, striated shape which becomes the handle. After being drilled and mitered, these pieces are hand buffed, then chemically polished in a bright dip. Finally, the handles are anodized for 25 minutes. This is called the Generalbrite finish.

Upon receipt of the wrap-arounds, Webcor applies a strip of decorative aluminum foil called Semlar, and



■ *Ability to perform a wide range of aluminum fabricating services makes General Extrusions Inc., an important factor in production of Webcor's Royalite tape recorders, of which there are two models. In the left photo, the ends of the instrument's extruded wrap-around are being riveted together. At right, these components are shown being given a 25-minute anodize.*

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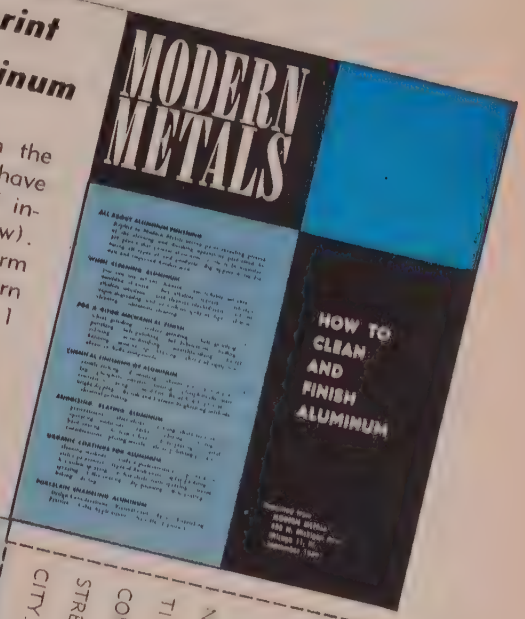


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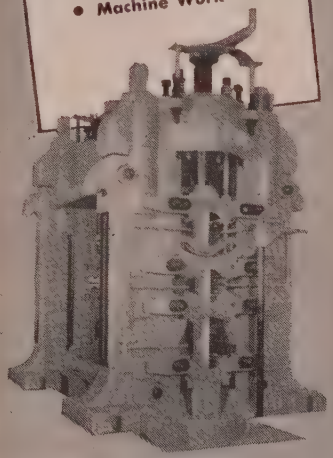

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GRAY IRON CASTINGS

made by Semrow Products Co., Chicago. It is 1-mil-thick foil, laminated to paper and perforated with .062-inch diameter holes on staggered centers. The laminate has an overall thickness of .020-inch. Semrow Products also makes a heavier thickness.

Webcor receives the laminate cut to length and of the proper width to fit in the trough of the extrusion. They run the strips through a machine with specially indexed dies to punch holes to correspond to holes in the wrap-around. Strips are next put through a roll coater which applies a thin layer of Sternoflex, a glue made by Swift & Co.

Sternoflex is shipped in 5-pound cakes. After melting down at 140°F, the user adds water to obtain the desired viscosity. Although this glue has found the greatest use in the luggage and book-binding fields, it proved to be highly suitable for bonding the paper back of the Semlar to aluminum.

Semlar is a rather economical decora tive material, and has been sold widely for use in the electronic instrument field. However, it has had some application to clock faces and could probably be used in other consumer items—in decorative panels for baby carriages, for instance. A novel application is for inner soles in young misses' slippers.

Total weight of the extrusions used in the Royalite II is probably no more than 2½ pounds per unit, but other aluminum components raise this figure somewhat.

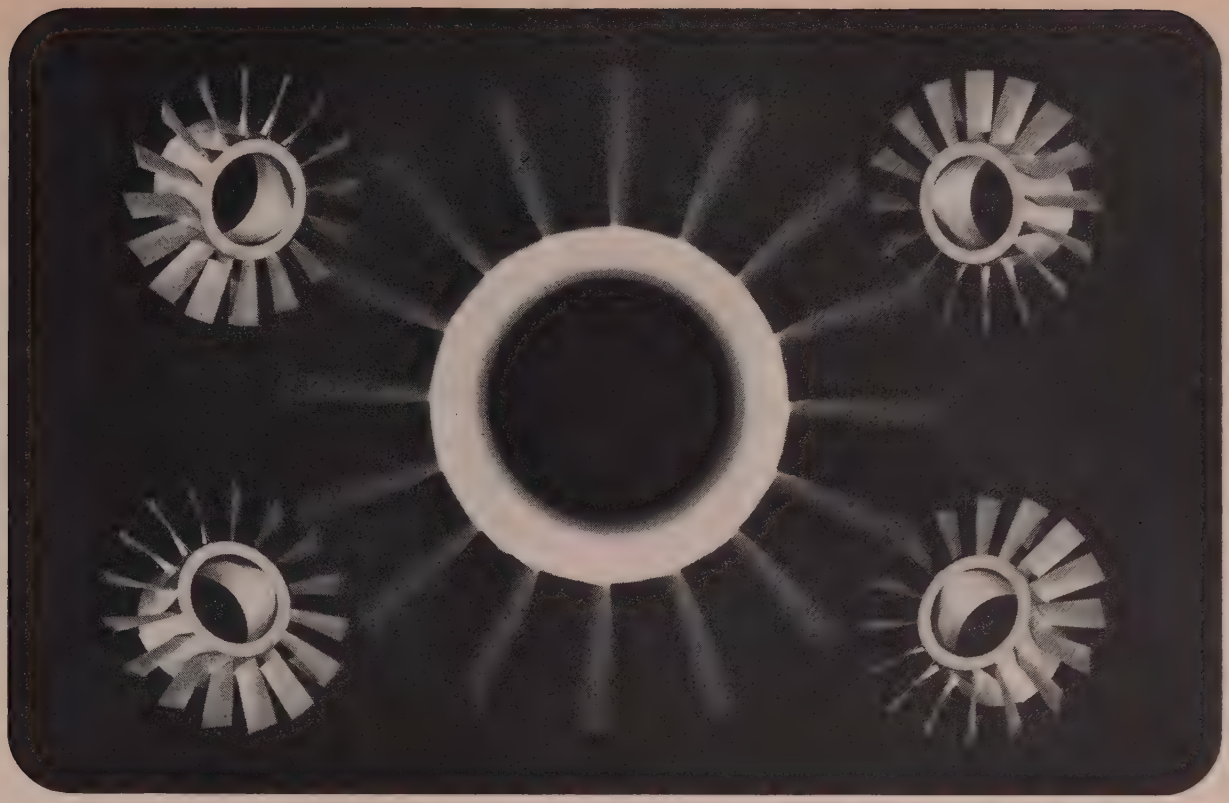
For instance, there is a textured aluminum top plate made by Croname,

■ *The Royalite II is the stereo version of Webcor's Model 2101 tape recorder. The instrument, shown with its stereo speaker enclosure, weighs 19½ pounds. Aluminum is a staple construction material for all types of Webcor units.*

Inc., Chicago. The blanks are notched by Webcor, then formed on a small press to produce a half-inch deep flange. The instruction plate tacked inside the front cover is made of aluminum and anodized and printed by Union Lithograph Co., Chicago. There are also several small stampings which bring the total number of aluminum components to about 15.

In manufacturing its entire line of products (44 different models), Webcor consumed about 200,000 pounds of aluminum, mainly die castings and extrusions, in '59. To individual aluminum suppliers, their portion of the whole might be considered trifling—except to GEI, where the accent is on service.

■ *After masking the outer ridges of the aluminum wrap-around, the channel is sprayed with a fast-drying BPS semi-gloss lacquer. At Webcor, the painted area will be covered with a strip of perforated, decorative aluminum foil.*



# Pinwheels for an Inferno

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Austenal Company, Microcast Products, casts such intricate parts as these by the "lost wax" method—and to check, lest any flaw lies hidden within, the castings are radiographed on Kodak Industrial X-ray Film, Type AA.

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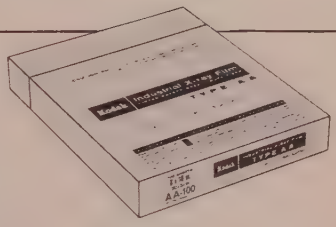

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- Gives increased detail visibility and easy readability at all energy ranges because of high film contrast.
- Provides excellent uniformity.
- Reduces the possibility of pressure desensitization under shop conditions.

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TRADEMARK

# Die Casting Engineers Discuss . . .

## Die Design
## Scientific Gains
## Applications
## Quality Control

First National Die Casting Exposition drew 4000 visitors to Detroit, and 500 registered at technical Congress. Thirty-one papers were given at technical sessions; 17 of them related to aluminum and magnesium die casting are abstracted here. Highlight of four-day gathering was presentation to Joseph Rayniak of initial SDCE Achievement Award for contributions to die casting industry.

MORE than 4000 U.S. and foreign die casters strolled the aisles of Detroit's Artillery Armory last month, inspecting the 80 exhibits presented at the first National Die Casting Exposition, which was held in conjunction with a technical congress attended by 500 registrants.

One of the high points of the general proceedings was the presentation of the first Achievement Award of the Society of Die Casting Engineers. The first to be so honored "for his outstanding contribution to the field of die casting," was Joseph G. Rayniak, vice chairman of the board and manufacturing research director of Outboard Marine Corp.

Rayniak, who was selected by Modern Metals as "Light Metals Man of the Year" for 1957, has made many outstanding contributions to die casting technology since 1920, when he joined Johnson Motors. As noted in Modern Metals' "Man of the Year" citation:

"Joe Rayniak has pioneered the use of aluminum die castings in outboard motors. His improved manufacturing methods have been the major factor in Outboard Marine Corp.'s rise to dominance in the outboard industry. They have also made his company one of the largest consumers of aluminum and probably the biggest producer-user of aluminum die castings."

In accepting the first Achievement Award, Rayniak called for a free exchange of technology to increase employment and raise living standards in America and abroad. "Your industry as a whole is still in its infancy," Rayniak told the die casters, "and untold rewards await those in the automotive field and other consumer products who are bold enough to venture forth and tap these resources."

Of the 31 papers presented at the exposition and congress, Modern Metals has selected 17 for review in the following report.

## Designing, Building Dies

The design and construction of die casting dies were covered in four papers. Two General Motors engineers—John Lapin and R. V. Stumph, of GM's Central Foundry Division—discussed the relationships between aluminum die casting design and gating variables. They also presented general conclusions "which could be applied by the designer."

In examining many production castings, three relationships proved most prominent: Wall thickness vs. filling time; casting weight vs. gate area; length of casting (from gate to farthest extremity) vs. gate velocity.

■ *Joseph G. Rayniak (right), vice chairman of the board and manufacturing research manager of Outboard Marine Corp., receives first Society of Die Casting Engineers achievement award from SDCE president, Ollie J. Clayton.*

The relationship between casting filling time and wall thickness was charted. It was concluded that filling time varies approximately as the square of the wall thickness.

Deviation of the individual production castings noted on the chart was approximately 20%. However, the square relationship was supported "remarkably well over the wide range of castings studied."

The gate area required to fill a casting of a given weight was also charted. Gate area was found to be a straight line function of the casting weight. A gate area of 0.390 square inch was required for a 10-pound casting.

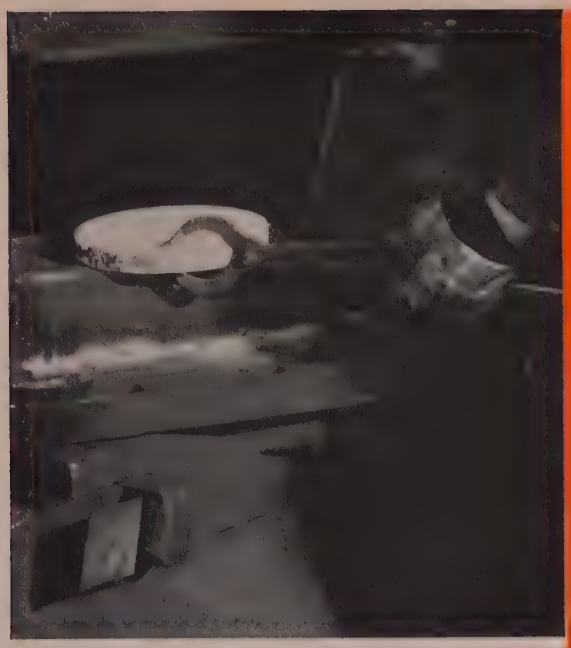
A basic equation for the solidification of ingots in the semi-continuous casting process shows that the depth of solidified metal is proportional to the square of the section thickness and to the rate at which the cavity fills times a constant of 1.7.

It was determined that the solidification of a die casting follows a similar pattern, though it is necessary to compensate for the faster solidification rates of die castings.

It was finally concluded that a factor of approximately 0.55 holds the best working relation between casting length and gate velocity. This factor was supported by empirical data obtained from the production castings.

**THE MANY STEPS** involved in designing dies for aluminum and magnesium die castings were detailed by Matthew McIntyre, McCulloch Corp. This Los Angeles firm produces two-cycle chain saws.

McIntyre said considerations in design include eliminating unnecessary machine operations, establishing principal



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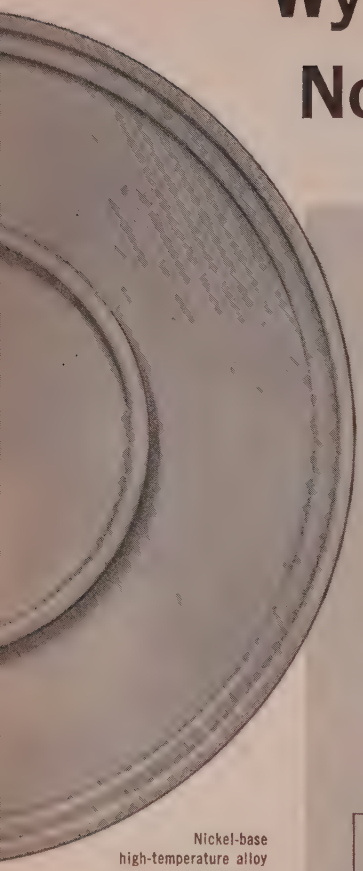
# Wyman-Gordon makes a major
# Now parts are being forged in



Nickel-base
high-temperature alloy
45″ diameter
520 pounds

## BROAD RANGE OF GAS TURBINE COMPONENTS ALSO BEING PRODUCED IN:

Low-Alloy, High-Strength Steels

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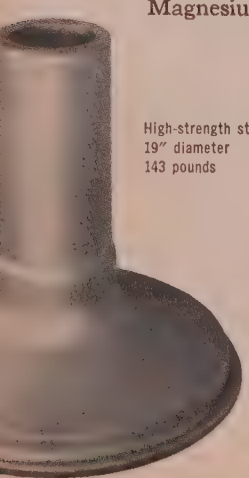

High-strength steel
19″ diameter
143 pounds

## PHYSICAL PROPERTIES

| TENSILE AND YIELD STRENGTHS | ALLOY* | TEST TEMPERATURE °F. | HEAT TREAT | GUARANTEED MINIMUM | | | TYPICAL VALUES | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | ULTIMATE TENSILE STRENGTH PSI | 0.2% YIELD STRENGTH PSI | ELONGATION % | ULTIMATE TENSILE STRENGTH PSI | 0.2% YIELD STRENGTH PSI | ELONGATION % |
| | Waspaloy | RT | A | 175,000 | 120,000 | 15.0 | 194,000 | 136,000 | 24.0 |
| | | 1000 | A | 162,000 | 112,000 | 13.0 | 175,000 | 124,000 | 23.0 |
| | René 41 | RT | B | 180,000 | 132,000 | 12.0 | 200,000 | 150,000 | 15.0 |
| | | 1400 | B | 135,000 | 115,000 | 13.0 | 145,000 | 125,000 | 18.0 |
| | Astroloy | RT | C | 190,000 | 138,000 | 10.0 | 205,000 | 152,000 | 12.0 |
| | | 1400 | C | 150,000 | 122,000 | 12.0 | 160,000 | 132,000 | 15.0 |
| | U-500 | RT | D | 175,000 | 120,000 | 10.0 | 195,000 | 135,000 | 12.0 |
| | | 1400 | D | 125,000 | 105,000 | 12.0 | 140,000 | 120,000 | 15.0 |
| | M-252 | RT | B | 170,000 | 115,000 | 15.0 | 185,000 | 125,000 | 20.0 |
| | | 1000 | B | 160,000 | 105,000 | 15.0 | 165,000 | 115,000 | 22.0 |

| STRESS RUPTURE | ALLOY* | TEMPERATURE STRESS | GUARANTEED MINIMUM | TYPICAL VALUES |
|---|---|---|---|---|
| | Waspaloy | 1350°F.—70,000 psi | 70 hours—6% Elongation | 130 hours—16% Elongation |
| | René 41 | 1350°F.—85,000 psi | 30 hours—8% Elongation | 60 hours—15% Elongation |
| | Astroloy | 1800°F.—20,000 psi | 20 hours—7% Elongation | 35 hours—12% Elongation |
| | Udimet 500 | 1650°F.—25,000 psi | 30 hours—6% Elongation | 55 hours—12% Elongation |
| | M-252 | 1500°F.—40,000 psi | 30 hours—8% Elongation | 55 hours—16% Elongation |

NOTE: The guaranteed minimums are based upon radial and tangential test locations.

## COMPOSITION AND HEAT TREATMENT

| CHEMISTRY | ALLOY* | ELEMENTS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | C | Cr | Mo | Co | Ti | Al | B | Ni |
| | Waspaloy | .08 | 19.0 | 4.3 | 13.5 | 3.0 | 1.4 | .004 | Balance |
| | René 41 | .08 | 19.0 | 10.0 | 11.0 | 3.1 | 1.6 | .004 | Balance |
| | Astroloy | .05 | 15.0 | 5.0 | 15.0 | 3.5 | 4.3 | .030 | Balance |
| | Udimet 500 | .07 | 18.5 | 5.0 | 18.3 | 3.0 | 3.0 | .003 | Balance |
| | M-252 | .15 | 20.0 | 10.0 | 10.0 | 3.0 | 1.3 | .002 | Balance |

| HEAT TREATMENT | | |
|---|---|---|
| | A. | 1850°F.—4 hours—OQ; 1550°F.—2 hours—AC; 1400°F.—16 hours—AC |
| | B. | 1950°F.—4 hours—AC; 1400°F.—16 hours—AC |
| | C. | 2100°F.—½ hour—AC; 1400°F.—16 hours—AC |
| | D. | 1975°F.—4 hours—AC; 1500°F.—24 hours—AC; 1400°F.—16 hours—AC |

NOTE: Refer to appropriate heat treat code in Tensile & Yield Strength table.

*Waspaloy: Pratt & Whitney Aircraft Corp.; René 41, Astroloy and M-252: General Electric Company; Udimet 500: Metals Division, Kelsey-Hayes Company.

# contribution to gas turbine progress . . . these new Superalloys with Guaranteed Minimum Properties

permits designing to higher operating stresses . . . increased efficiency . . . greater component reliability for every gas turbine application

Rapid progress in developing the gas turbine has materially extended application of this prime power source to areas other than aircraft. Significant contributions in forging techniques and metallurgical advancements by Wyman-Gordon have in part made this possible.

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**WASPALOY**

**RENÉ 41**

**ASTROLOY**

**UDIMET 500**

**M-252**

**MEETING DESIGNERS' NEEDS IN EVERY TURBINE APPLICATION**

- Aircraft and Missile
- Nuclear Power and Propulsion
- Rail and Highway Transport
- Power Generation
- Air Supply and Pumping
- Pipeline Boosting
- Auxiliary Service
- Automotive
- Marine Propulsion
- Stationary Power

# WYMAN-GORDON

## FORGINGS

*of Aluminum Magnesium Steel Titanium . . . and Beryllium Molybdenum Columbium and other uncommon materials*

HARVEY ILLINOIS WORCESTER MASSACHUSETTS DETROIT MICHIGAN

GRAFTON MASSACHUSETTS LOS ANGELES CALIFORNIA PALO ALTO CALIFORNIA FORT WORTH TEXAS

part locating points for machining, and determining basic dimensions. Another important aim is to make dies versatile so they can meet the changing requirements of yearly equipment redesign.

McIntyre cited one particular die, designed five years ago, which has turned out more than 250,000 castings. Various components have been replaced but the same basic die is still producing castings of various bore sizes and cooling fin configurations for five different models of chain saws.

**REDUCING** and controlling the cost of mold fabrication requires careful consideration of three main factors, according to Rolf H. Berg, Atols Tool and Mold Corp.

Consider those moldmaking costs that are affected by the product's design requirements; costs which are incurred as a result of the mold's design and costs resulting from the methods and procedures planned for actual construction of the mold.

Vital points to consider in the first area include choice of steels for the die block, coring, and proper placement of water lines for maximum cooling.

Mold building costs include materials, direct and engineering labor, and manufacturing overhead.

Mold design costs are minimized by proper blueprinting of the die so that steel does not have to be altered.

If all costs are detailed, they can be analyzed and trouble spots eliminated. Rolf pointed out that though companies keep these costs for each particular job, by the time trouble spots are noticed, it is too late to correct them.

To eliminate this, systems must be devised which predict trouble. One company has each component of a completely designed die casting detailed and numbered. Then, actual labor time expended is posted daily on a control sheet.

Such information allows supervisors to determine labor hours for the entire job and for each separate operation. Also, hours put in daily and estimated hours needed for completion can be figured. This data permits scheduling of operations so promised delivery of the completed mold can be maintained.

Finally, Rolf said that close collaboration between product and mold designer, mold builder and die casting engineer are vital if a product idea is to be economically translated into a finished die casting.

**THE MOST POPULAR** metal used for aluminum and magnesium die casting dies is AISI H-13 hot work tool steel. Arthur Scholz, of Crucible Steel Co. of America, detailed the properties and characteristics of H-13.

Freedom from internal defects is very important. The H-13 steel is not as clean as other steels, but it possesses other vital properties. For this reason, two tests—hot acid etch on a slice of ingot, and ultrasonic inspection — are used to assure die makers that the particular batch of metal they are using is suitable.

Scholz detailed other requisites of a die casting steel in relation to H-13:

*Machinability and polishability*: H-13 is supplied in the annealed condition and can be machined with high speed steel or carbide tools without excessive tear, drag or tool chatter. A double or triple temper or a deep freeze treatment is needed to minimize the amount of retained austenite (a condition which promotes orange peel effect) so that the die can be polished properly.

*Strength and toughness*: Providing the die has been correctly designed, H-13 steel possesses sufficient strength and toughness to resist the combined stresses set up by injection and clamping pressures and thermal stress.

*Stability in heat treatment*: General rule of thumb is to allow .0005 inch per inch growth in length and about .0002 inch per inch growth in width.

*Weldability*: H-13 can be MIG and TIG welded.

*Resistance to erosion and heat checking*: The author commented that H-13 performs adequately in this area, but qualified this by noting that "there is a lot to learn about the mechanics and causes of erosion and heat checking."

He then discussed heat treating die casting dies to produce required properties. He recommended stress relieving after rough machining and prior to heat treating to minimize size change.

Other procedures include hardening; nitriding where high wear resistance is needed; and oxidizing because the oxidized surface acts as a lubricant and retards the start of heat checks.

## Technological Advances: Sonic Energy Boosts Casting Quality; How to Automate; How to Operate a Short-Run Department

**TECHNOLOGICAL** advances and economical operations were covered in three papers. A technological advance of the first magnitude is the use of sonic energy to achieve a dramatic improvement in die casting quality. A discussion of this new technique was submitted by John Weber, of Southern Die Casting & Engineering Co., and Earle Rearwin, of Reed-Prentice.

The proper application of sound (or vibratory energy) to the casting die can improve quality in many ways: It breaks up the dendritic structure of metal during solidification, thus minimizing voids; it reduces porosity by tending to "bleed off" entrapped gases; and it improves die filling by "moving" metal into remote or restricted areas of the die during solidification.

The influence on mechanical properties can be outstanding. The authors cited a test on aluminum castings in which tensile strength was boosted 38.8%, and yield strength 41%, compared with conventional die casting methods. Photomicrographs of test samples showed a marked refinement of crystal structure obtained by vibrating the mold.

The method has also been proved out in production runs. A hard-to-cast electronic part (24 inches long, ½-inch thick) had been suffering a 30 to 40% reject rate. But after a sonic vibrator was properly positioned on the die, 10,000 shots were made without one casting being scrapped.

The authors briefly described the different types of vibrator units used in the technique, and the difference between sonic and ultrasonic vibration. In the case of the ultrasonics, they pointed out that entrapped gases can be dispersed into tiny particles which are dissolved by molten metal, and that oxide inclusions are broken up into finely-divided, harmless particles.

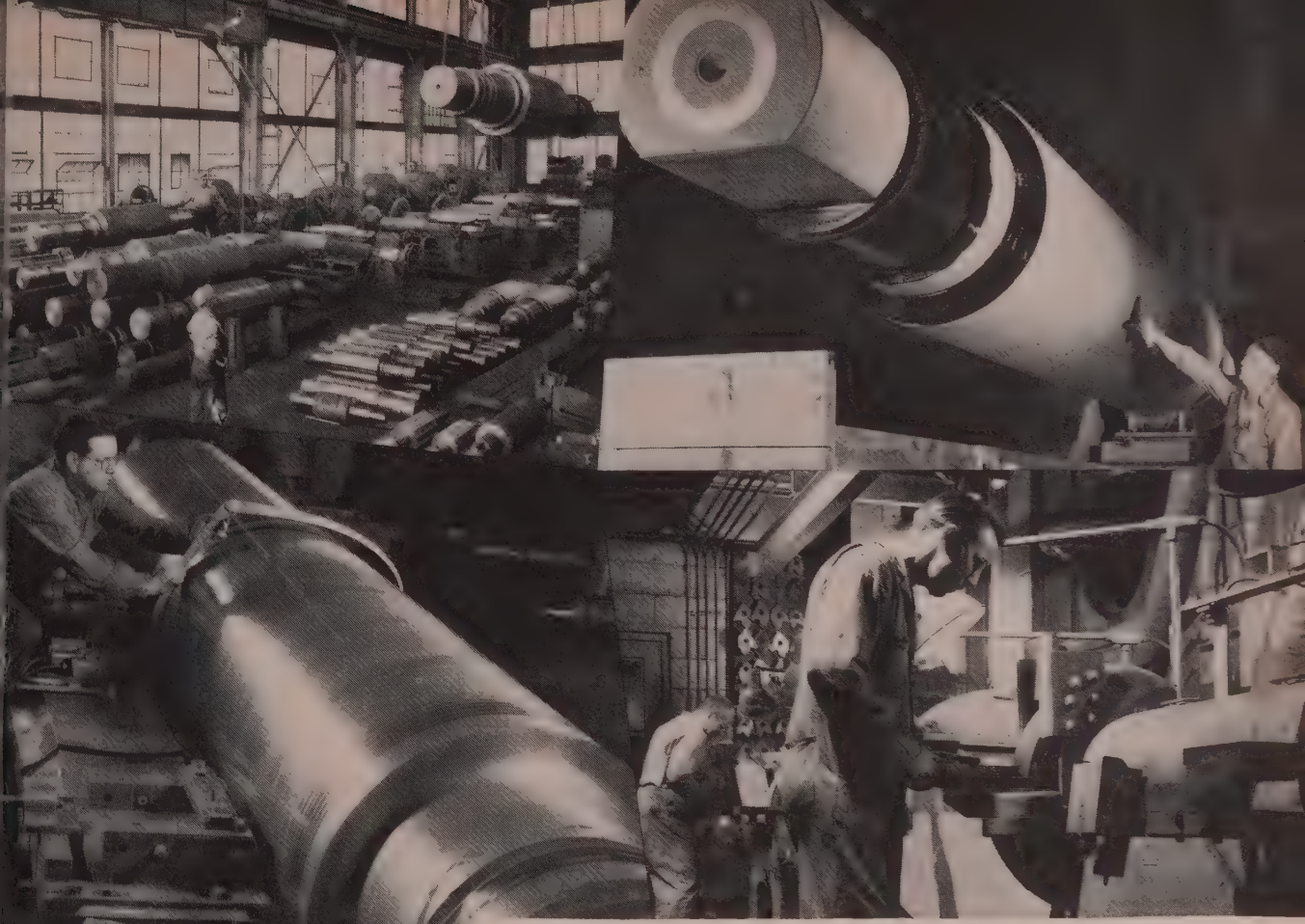
Ultrasonic vibration can also be used to permit a no-draft core to be pulled from a completely solidified casting — to produce an internal bearing area, for example. In conclusion, the authors asserted that the new technique must not be used in an attempt to correct existing faults in die design.

**AUTOMATIC** die casting is a process or tool which can and should be used each time it is shown to be economically beneficial, according to L. S. Garretson and Tom E. Nadeau, of the Hardware and Accessories Div'n., Ford Motor Co.

The authors first pointed out the operations which can be automated—die cleaning and lubrication, die closing, plunger lubrication, metal transfer and injection, die opening, and casting ejection and removal. A detailing of process variables—metal temperature, die temperature, metal volume, injection speed and pressure—followed.

The paper went on to discuss the transition to automation, its impact on management and workers and its benefits, disadvantages and justification.

It was pointed out that transition to automation is not complex or costly



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*ROLLS*

as long as the plan for automating is deliberate and based on policies which employ the most promising technological advances.

One problem caused by automation is the fear of plant employees that they will be jobless. Garretson and Nadeau ridicule the idea of "a die casting machine operating without a soul in sight." And they point to four areas where the "man" is needed: To attend and supervise three or four machines; for set-up and process inspection; trimmers, etc.; and in those die casting operations which will gain little or no advantages from being automatic.

Automation also affects management, which must develop efficient programs for employing die cast operators. Such programs should include a steady expansion of operations and facilities, methods of operating on fluctuating schedules with a steady work force, incentive wage rates for direct and indirect labor, and a flexible program of operator education.

Automation will benefit a shop by increasing its casting rate, reducing scrap, limiting the work force, lengthening die life, and permitting maximum safety. But there are some disadvantages: Increased supervision and control of variables is necessary; increased inspection of parts is needed; fewer shots are produced per setup; setup time is longer; and investment in equipment and controls is higher.

The savings resulting from automation on one job does not justify the switch, nor does a slightly higher cost on an automated job mean a shop should not be automated. The major justification of automation is the overall benefit accumulated through the years.

**TIPS** on how to set up a short-run die casting operation were given by D. H. Naffziger, of Delco-Remy Division of General Motors. For best efficiency, he recommended separation of short-run and high volume operations.

Three approaches to such separation were proposed: All production in one area (preferably with machines grouped in relation to high and low volume runs); high volume production in one department and low volume production in another; and high volume production and heavy castings of short run in one department and small castings of short run in a separate department.

One isolated short-run casting area was detailed by Naffziger. It consisted of a 60-ton air operated hot chamber machine, metal melting and ladling facilities, one conveyor, and one trimmer. One man runs the department, acting at metal tender, setup man, machine operator, and trimmer.

This department runs 40 different parts requiring 100 to 10,000 castings each month. One shift a day is needed, with the machine running an average of 600 cycles per hour.

Naffziger also explained the points to be covered when organizing a new short run department and how to set up its administration and engineering.

First, he said, establish a planning committee and methods of communication, and a system of keeping accurate production records. From then on, problems revolve around good product design, production engineering, tool follow-up and production scheduling, actual production, maintenance of equipment, general machine and tool design, labor, and the use of automatic equipment and machinery.

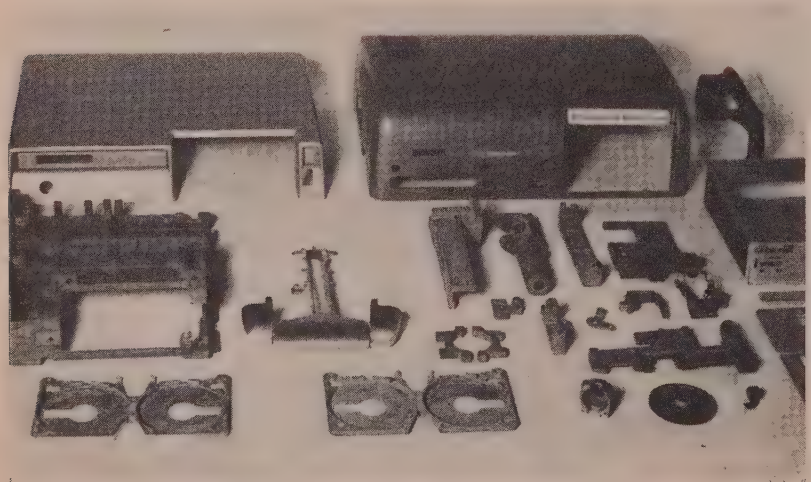
# LIGHT METAL APPLICATIONS – Russia to Die Cast 4-Cylinder Engine; America Leads Europe in Aluminum Auto Engine Block Development; Dictaphone Happy With Magnesium Components

**OF THREE** papers on the subject of light metal die casting applications, two dealt with automobile engines. The first European die cast aluminum engine block will be made in Russia, according to A. Triulzi, whose firm, A. Triulzi S.A.S., Milan, Italy, will soon deliver the special die and die casting machine to the Soviet Union.

The die will produce 4-cylinder engine blocks, Triulzi said, and an 8-cylinder block is being designed.

The 4-cylinder block will be water cooled, will have 2.5 litre capacity, and will be fitted to a 2500-ton machine, said to be the largest ever built. The casting cycle is fully automatic. After starting, the following takes place: Clamping of the die; metering of molten metal; injection; opening of die; pulling of cores; ejection of pieces; unloading and conveying of pieces to machining.

Sleeves will be inserted after casting. However, if required, a device can be designed so sleeves can be cast directly in the die.



■ ***Magnesium and aluminum die cast components used in the manufacture of Dictaphone Corp. dictating machines. Firm started using magnesium die castings in 1950; says they are pleased with service life of these parts because "even when our unit is submerged in salt water, and electrical components destroyed, the die-cast parts have remained intact and have not been seriously damaged."***

**AMERICA** definitely leads Europe in the design and development of lightweight, die cast aluminum engine blocks, according to A. F. Bauer, of Doehler-Jarvis Division, National Lead Co., Toledo.

Europeans have made extensive use of lightweight aluminum and magnesium parts in rear engined cars mainly for weight balance, but are still sticking with the cast iron engine block for their front engined cars, Bauer emphasized. American engineers are using aluminum to increase car performance by reducing weight, he added, and are far ahead of the Europeans in the development of front mounted engines.

As an example he cited the new Rambler engine block produced by Doehler-Jarvis. It is the first water cooled, die cast, six-cylinder engine block in the world. More than 50,000 blocks have been cast by a method which forces hot metal into a cavity and ejects

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Here is just a partial list of avenues used by Alcoa to help you sell. Alcoa TV commercials appear regularly on two network TV programs. Radio is used to reach customers when they aren't watching television. Magazines—both consumer and trade—and many other promotional tools for industry support and direct customer support to help you sell your products. There is an element in Market-Maker promotions that will fit your particular selling need.

Brand-conscious consumers know and respect the Alcoa label. And alert retailers constantly feature the label in their advertising and in-store displays to tell customers about the benefits of aluminum products.

If you aren't already making full use of Alcoa Aluminum in your manufacturing operations—or would like more information about Market-Maker promotions and Alcoa's label program, here's your invitation—write Aluminum Company of America, 2076-M Alcoa Building, Pittsburgh 19, Pa.

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# LOWER THERMAL CONDUCTIVITY means

THERMAL CONDUCTIVITY COEFFICIENT*
B&W • IFB • 1.91
Competitive IFB • 3.04
NOTE: The above chart, based on available published figures, compares the difference in thermal conductivity between lightweight B&W IFB and the average of seven other leading insulating firebrick. This example, specifically covering 2300 F use limit insulating firebrick, is representative of the low conductivity of B&W IFB at all temperature levels.
*BTU/SQ. FT./IN. THICKNESS/HR./DEG. F.

All insulating firebrick are not the same. Published figures show wide variations in *all* of the important properties among the leading brands of IFB.

Take thermal conductivity. This important property affects fuel costs, temperature control and the speed with which a furnace heats and cools. Thermal conductivities range from a B&W low of 1.91 to a high of 3.47 for a competitive IFB—*almost a 100% difference in wasted heat and fuel costs.*

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For complete information on B&W Insulating Firebrick, write for Catalog R-2-H to The Babcock & Wilcox Company, Refractories Division, 161 East 42nd Street, New York 17, N. Y.

NUMBER 1 OF A SERIES

# LOWER FUEL COSTS

*the payoff*

- 14% lower fuel costs • 30 F lower casing temperature
- 25% less time to reach operating temperature • 12 hours saved per cycle

These are the results of a direct comparison of two furnaces of the type shown above, one lined with B&W IFB and the other with one of the better competitive insulating firebrick. That's how B&W pays off for a major steel company in their 8-stack, hood type, strip annealing furnaces. This is just one of many proofs in our files that "there is an important difference in insulating firebrick."

B&W

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the finished, cooled block by opening the dies.

Blocks have cast-in cylinder liners and weigh only 68 pounds. They are made on huge 2000-ton pressure die casting machines, of proprietary design, each having dies weighing 25 tons.

Bauer predicted a great future for the die cast aluminum engine block, and expressed his conviction that in a few years the traditional cast iron engine will be replaced by ones of aluminum.

**DIE-CASTINGS** have played an important part in the progressive design of dictating machines produced by Dictaphone Corp. in the last 40 years, according to a paper by F. W. Roberts, Dictaphone's vice president of research.

He traced the evolution of Dictaphone castings from when they were first used in 1918 to the die cast magnesium components used in current models. The use of magnesium was adopted in 1950, and the combination of die casting and magnesium has been a satisfactory one for Dictaphone.

"Our machines are sold and used throughout the world," Roberts explained, "yet there has been very little trouble with corrosion, even in the tropical islands of the South Pacific. Even when our product is submerged in salt water, and the electrical components have been destroyed, the die cast parts have remained intact and not seriously damaged."

# QUALITY CONTROL — The Machine; Identifying Defects; Metal Handling; Process Variables vs. Metallurgy; Controlling Casting Quality for Anodizing; Temperature; Tips on Quality Production

**QUALITY** control in the die casting plant was the subject of seven interesting papers. Die casting has been called an art, but art must be replaced with science if the die caster is to control the quality of his castings, said Earle W. Rearwin, of Reed Prentice Division, Package Machinery Co.

He cautioned that controlling casting quality as it is affected by the components of the die casting machine means considering many complexities which involve short time cycles. Tenths of seconds, and sometimes milliseconds are dealt with, so it is necessary to use instruments to measure these phases as to both time and force.

Rearwin confined his presentation to the injection portion of a hydraulically operated machine. He says casting quality hinges on the following:

Hydraulic pump and accumulator, pilot valves initiating the shot, electric control circuit which triggers the pilot valve, and hydraulic operating valves which control the injection plunger stroke.

Equally important is the type of hydraulic fluid used, its condition and temperature. Also to be considered is the condition of the hydraulic shot piston, the metal plunger and tip. Other important considerations include character of casting runner and casting gate, area and conformation of cavity vents, and the viscosity of the molten metal.

These are the complexities of the die casting machine which must be controlled to obtain uniform casting quality.

**A REPITITIOUS** die casting defect costs time and money, so its early and proper identification is extremely important. G. L. Armstrong of U. S. Reduction Co., and Robert Harder, of Lukens Aluminum Co., suggest using a metallograph for accurate detection and identification of irregularities.

The metallograph is a microscope used to photograph small areas of sectioned castings. Types of defects spotted by the tool include those due to shrinkage and entrapped gas, cold shuts and die lubricant entrapment, and nonmetallic inclusions. A metallograph can also be used to spot defects in anodized castings.

Armstrong and Harder emphasized the importance of not only finding defects, but also accurately identifying them so that proper steps can be taken for their elimination.

For example, efforts to eliminate porosity actually caused by entrapped gas, but which has been interpreted as shrinkage, will be useless and costly. However, defects can be diagnosed accurately by using the metallograph. The enlarged voids due to shrinkage will show ragged edges and a dull cavity, while voids caused by porosity will be rounded and highly reflective.

**PROPER METAL HANDLING** and control play a vital role in producing high quality aluminum die castings, according to a paper by F. W. Foss, of Apex Smelting Co., Chicago. He covered several areas which die casters should examine to assure their production of high quality pieces.

Foss discussed fuel fired and electric furnaces and urged that the following factors be considered if melting equipment is being purchased or changed: Melting loss, rate and cost; capacity of furnace; ease of cleaning; durability of construction; and refractory for low maintenance.

Foss cautioned die casters to select the proper casting metal; to have a set plan for metal handling, storage and changing metal to the furnace; to work at correct melting temperatures and to control the temperature to avoid formation of sludge and metal oxides. He also pointed out that proper fluxing compliments good metal.

Common problems of the die caster were attacked also. Foss said hard spots due to dross or aluminum oxide are usually caused by careless metal handling or housecleaning.

Porosity will be caused by trapped air, shrinkage or volatilization of excessive die lube. Trapped air voids necessitate changing the gating or venting or varying die or metal temperature. If die lube is causing the problem, use as little as possible.

Shrinkage can usually be stopped by raising or lowering the heat in the die at various areas, altering the flow of coolant or, in extreme cases, changing gating and/or venting.

Laminations, or cold flow, are usually solved by adding more heat in the die or increasing metal temperature.

**A STUDY** of the influence of gas content, pressure, and magnesium content on the mechanical properties of aluminum die castings (type AL-8-Si) was conducted by Injecta Ltd., Teufenthal, Switzerland, and reported on by Dr. Werner Ruegg.

The experiments studied the three variables at two levels (low and high) with die cast standard test bars. Mechanical properties (yield strength, tensile strength, elongation, impact strength) were affected by pressure and magnesium content. However, these properties were more or less insensitive to dissolved gas (hydrogen).

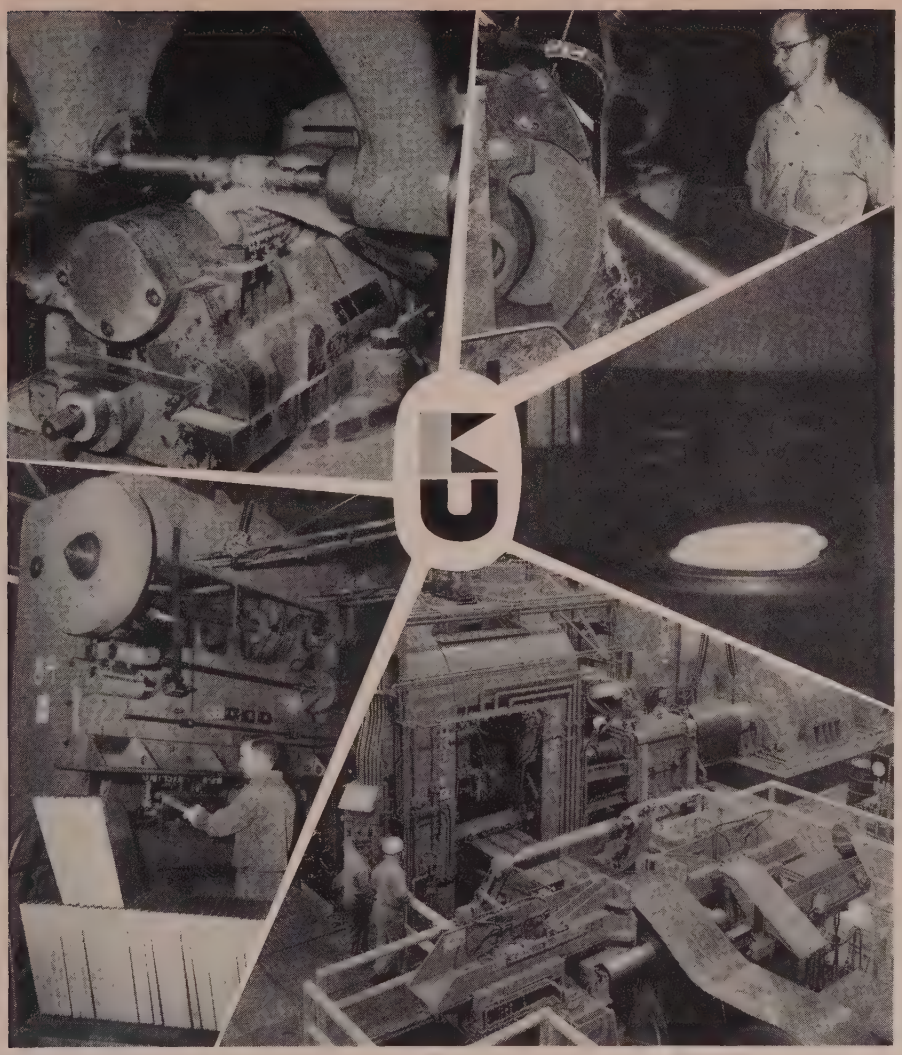
There was a distinct increase—9%—in the yield strength of castings with the addition of magnesium.

Some foundry experiments—producing similar results—with normal, gassed and degassed metal as starting material for die castings and tests on corresponding die castings, completed the study.

It was concluded that the mechanical behavior of aluminum alloy die castings depends more on process variables (pressure, die and metal temperature, etc.) of die casting and die design, and alloy composition, than on metallurgical treatment of the alloy to reduce gas.

**CONTROL** of casting quality is especially important when the product is to be anodized or plated. Some pointers on how to assure good quality for these operations were offered by Robert Harder, of Lukens Aluminum Co.

(*Continued on page 70*)



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# 5 GOOD QUESTIONS ABOUT ALUMINUM FORMING...

Here are answers Kaiser Aluminum Distributors have given to specific questions about forming aluminum. If you don't see the answer to your question here, ask your Kaiser Aluminum Distributor.

**Q. What press capacity is needed to bend ⅛ 3003-H14 to a right angle in an "air bend" press brake operation?**

**A.** See chart below.

**APPROX. PRESSURE IN TONS PER FOOT OF LENGTH FOR BENDING 3003-H14**

| Metal Thickness Inches | Width of Die 3/8 | 1/2 | 5/8 | 3/4 | 7/8 | 1 | 1¼ | 1½ | 2 |
|---|---|---|---|---|---|---|---|---|---|
| .032 | 0.50 | 0.37 | 0.30 | | | | | | |
| .048 | 1.08 | 0.91 | 0.65 | 0.54 | 0.462 | | | | |
| .063 | 1.83 | 1.38 | 1.10 | 0.92 | 0.80 | 0.69 | 0.55 | | |
| .080 | 1.00 | 2.25 | 1.80 | 1.50 | 1.30 | 1.13 | 0.90 | 0.75 | |
| .094 | 4.15 | 3.11 | 2.49 | 2.07 | 1.78 | 1.56 | 1.24 | 1.04 | 0.78 |
| .125 | | 5.25 | 4.40 | 3.67 | 3.15 | 2.75 | 2.20 | 1.94 | 1.38 |
| .188 | | 11.10 | 8.80 | 7.34 | 6.29 | 5.50 | 4.40 | 3.67 | 2.75 |
| .250 | | 22.0 | 17.7 | 14.7 | 12.7 | 11.0 | 8.80 | 7.40 | 5.50 |

Derived by: Tonnage = (1.33) $\frac{\text{tensile} \times 12'' \times t^2}{\text{width of Die} \times 2000}$

Pressures shown are for 3003-H14, for 1100-H14 multiply by .82, for 5052-H34 multiply by 1.73 and for 2024-T3 multiply by 3.18. For any other alloy or temper: $\frac{\text{typical tensile}}{22{,}000}$ times the figure shown in the table.

The tonnage shown is for an angle bend of one foot in length. For any other length, multiply pressures shown by length of stock in feet. Bend radii should be used as recommended by your Kaiser Aluminum Distributor and width of die required to produce such a radius may be found by the formula Wd = R/.156 where Wd = width of die, R = radius desired and .156 is a constant when the punch, or knife, radius is equal to or greater than the metal thickness.

Best control of aluminum alloys is obtained when the punch radius is equal to or only slightly less than the finished inside radius desired.

**Q. What preparatory steps should I take before forming aluminum?**

**A.** It is essential that all scale from previous steel forming operations be removed from the die members before processing aluminum. It is also good practice to be sure the die is free from tool marks, nicks and gouges. A little lubricant applied to the die every second or third hit is good insurance for proper forming of aluminum in press brake operations.

**Q. How can I eliminate flat spots on 2024-T4 bar stock which I put through a centerless through-feed grinding operation?**

**A.** The cause is undoubtedly the result of having insufficient driving power between the feed wheel and the work, allowing the work to stop rotating at in-


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## AND 5 GOOD ANSWERS BY KAISER ALUMINUM DISTRIBUTORS

tervals during the grinding cycle. The remedy is to apply a pressure roller to the top of the work-piece or leave more stock for the grinding operation to remove.

**Q. How can I prevent slug pick-up when punching .125 diameter holes in .020 aluminum sheets?**

**A.** Reducing the die clearance to 5% or .001; for example, the use of a .125 diameter punch and a .126 diameter die opening usually remedies slug pick-up on light gauge aluminum sheet. It might also be well to check the viscosity or tackiness of the lubricant. Piercing generally requires only a thin film of a light bodied lube.

**Q. I have heard that elongation determines formability; that is, the greater the elongation the better the formability. How then can I judge 1100-H14 against 5052-H34 since their typical elongations are both rated at 9%?**

**A.** Formability is a simple name for a complex property effected by many characteristics of the alloy and forming conditions. Elongation is only one of many indicators of formability. One other gauge is the bend radii.

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Plated castings are often rejected because of flaking due to the presence of non-metallics. To avoid this, keep work areas as clean as possible, use proper fluxing procedures for removal of larger oxides, and use a lubricant with a highly refined solvent that will volatilize completely at below the usual die temperature (450-600° F).

Segregation of alloying elements in the holding pot causes a sludge which gives the casting an uneven sheen and causes a rejection. To stop sludge formation, the manganese content of the alloy must be minimized, and in pot type furnaces, scrap should be preheated to approximately 500° F before entry into the melt. Harder also recommended the use of casting alloy 356.

In casting parts to be color anodized, careful metal handling, fluxing, and mold lubrication are vital to prevent contamination, he added.

Harder also explained that all alloy families do not possess a combination of properties which offer easy casting and simple anodizing. The aluminum alloys he proposes for die casting anodizable parts are in the zinc (3.5 to 5%), copper (1.5-2.5%) and iron (.75-1.5%) family.

Alloys in this group exhibit excellent fluidity and overall foundry characteristics: do not dross or form oxides: and, because zinc and copper are in solid solution, the casting can be treated as pure aluminum. This means anodizing processes are shorter and done at lower voltages than normal cycles for die-casting.

**TEMPERATURE** control in work areas is vital to many industries. The importance of such control to die casting was detailed in a paper presented by Ross Dean, of Sterling, Inc.

Dean defines temperature control as "keeping a die at the best temperature for maximum production of parts of acceptable and consistent quality." Closely related to exerting control are such factors as die design, metals to be cast, type, size and specifications of die casting machines, he added.

To control temperature properly, equipment must include a source of heat, a source of cooling, proper control for each, and the proper fluid and pump. By expertly applying this equipment to the die casting machine, the following advantages should result:

Effect of human element in casting will be reduced; hazards of die checking and premature die failure will be reduced; time required for start-up and for resumption of work following breaks will be reduced; casting finish and quality will be improved; effects of soldering will be reduced; consumption of water will be reduced.

The entire die must be analyzed to see which parts need heating or cooling, Dean explained. It may be necessary to control the temperature in each half of the die, or to provide several different temperature zones on each die half.

Location of heating and cooling channels is important and always difficult because of part designs, location of ejector pins, slides, etc. But the efficiency of channels, even if ill-placed, will be greatly improved by the use of proper temperature control equipment.

Good equipment will offer a wide range of temperatures, broad pumping capacities, and flexible degrees of accuracy. It will also minimize the human element in control, increase casting quality, and efficiency of operation.

A final suggestion offered by Dean is, always consider the many variables of temperature control along with an analysis of each part to be cast.

**QUALITY** castings result when care is taken during all of the various operations needed to complete a die cast part, declared Al Sugar, of Hydraulic Press Mfg. Co. But such care is effective only when a smoothly working machine is used with a properly designed and constructed die and a suitable alloy.

"Only after all of these requirements have been simultaneously — not separately — met, can consideration be given to other variables in the die casting process, to their control within close limits, and to their individual effect on the quality of the finished product," Sugar explained.

He also discussed the importance of careful, well thought-out procedures for handling a casting job. Proper melting is vital, he said, and a two-stage system separating break-down and holding units should be used.

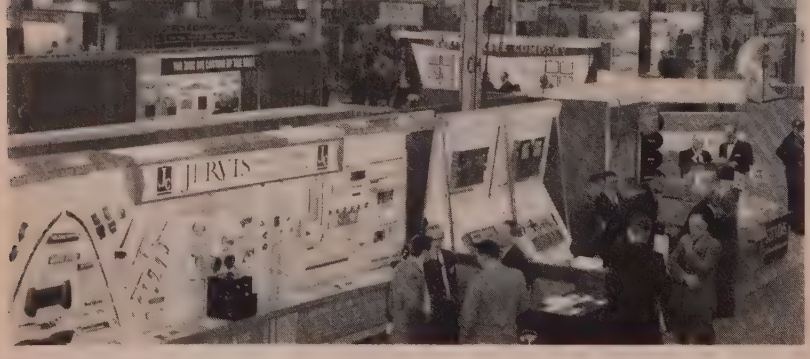
He also cautioned against allowing excessive formations of sludge, and warned that transfer of metal from breakdown to holding furnaces should be done with a minimum of turbulence. Metal in holding units should be kept as quiet as possible at all times, and skimmed only occasionally, he added.

The importance of good design; the judicious use of ribs, beads, bosses, fillets and fins, and adequate provisions for ejector pins was pointed out.

Sugar closed by recognizing the casting industry's efforts to improve casting quality. He said better machines are being made and noted that greater attention is being given to the control of those details which determine the soundness and quality of products.

# Exposition, Congress Termed Success; More Sessions Planned

Competitors of die casting were also given some attention. "The Competitive Aspects of the Permanent Mold Process" was discussed by Frank S. Ross of Permanent Mold Die Co., Inc.; "Aluminum Sand Casting — A Competitor of Die Casting," was presented by T. B. Pfaff, of General Motors; and "Plastics — Competitor of Die Castings," was covered by W. C. Bracken, of Hercules Powder Co.




■ *Portion of First National Die Casting Exposition held in the Detroit Artillery Armory. More than 4000 persons inspected 80 exhibits.*

Other discussions detailed the effect of casting defects on quality of electroplated zinc die castings; establishing die casting costs; mathematical determination of die design, and the growing use of impregnation materials and techniques.

This first die casting exposition and congress was a success, according to its chairman John L. MacLaren. He reported that because of the enthusiasm shown, the SDCE plans to sponsor a continuing program of such gatherings—an excellent medium for disseminating up-to-date technical information to die casters.

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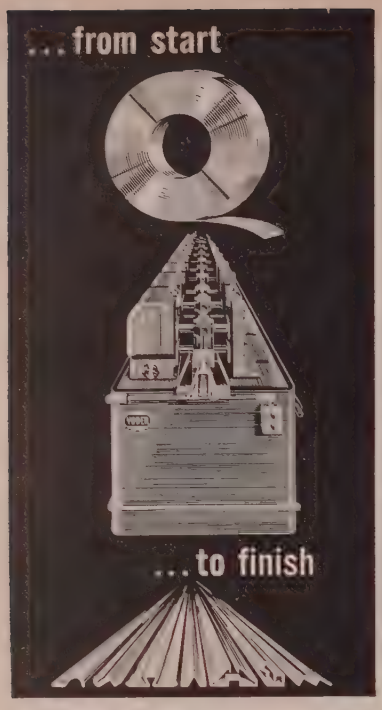


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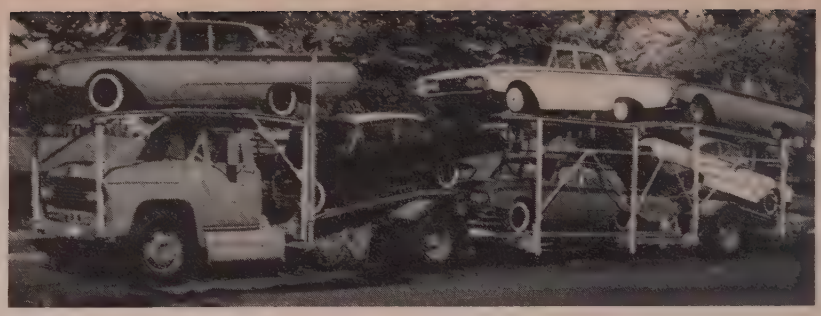

# Car Transportation Costs Slashed 10% By Welded Aluminum Trailer

TRANSPORTING new automobiles via standard steel trailers causes huge gas and tire bills—mainly because the carrier itself weighs close to 5 tons. But a northwestern manufacturer of auto carriers has switched to welded aluminum construction which cuts these costs 10% and increases payload by one car.

Westland Trailer Co., 2300 N. W. Nicolai Ave., Portland, Ore., was making steel units which weighed 9400 pounds and carried four standard size automobiles. But Leroy Francis, manager of the firm, found that his customers were having cost problems with the heavy duty models. The weight made them expensive to operate—with fuel consumption high and tires thinning quickly—even on return trips with an empty trailer.

To help customers cut costs, it was decided to design two models of light weight, welded aluminum. The larger, Model D-G (shown above), is a 5600 pound tare aluminum carrier with a five car capacity (sixth car is carried on cab). Francis says deadweight is cut 10% with operating costs of unloaded trailers correspondingly reduced.

The smaller unit, Model S-E which weighs 5400 pounds, is a standard four-car trailer which converts into a flat-bed carrier so it can haul other freight on its return journey to help defray operating costs.

Except for the steel axles all trailer components are aluminum. Skids, rails and ramps are made of 6062 alloy, while the raised deck tubing is of 6061. Sand castings are of alloy 356. All metal is treated to the T-6 condition.

Semiautomatic metal-inert-gas welding equipment, supplied by Linde Co., is used in fabrication. A current of 250 amps is used while a 1/16-inch diameter wire is fed to the arc at 55 inches per minute. Welding in all positions is required, each weld needing one pass.

During initial stages of the switch from steel the aluminum filler wire used when welding caused work stoppages. But then a precision spooled, extruded aluminum wire supplied by All-State Welding Alloys Co., Inc., White Plains, N .Y., was tried. The 5356 filler worked, and the transition proceeded smoothly from then on.

The aluminum trailers cost more than steel. However, according to a Westland spokesman "the added payload, lower weight and reduced maintenance requirements result in a substantial savings" which defray the extra initial expense. Francis says old customers are satisfied and new ones sold.

Trailers made by Westland this year will consume more than 400 tons of aluminum and 10,000 pounds of aluminum welding wire.

■ ***Weldor joins support member to framing which fits over cab. Frame is used to carry an additional car (see photo above), and also forms the support to which the trailer is attached.***

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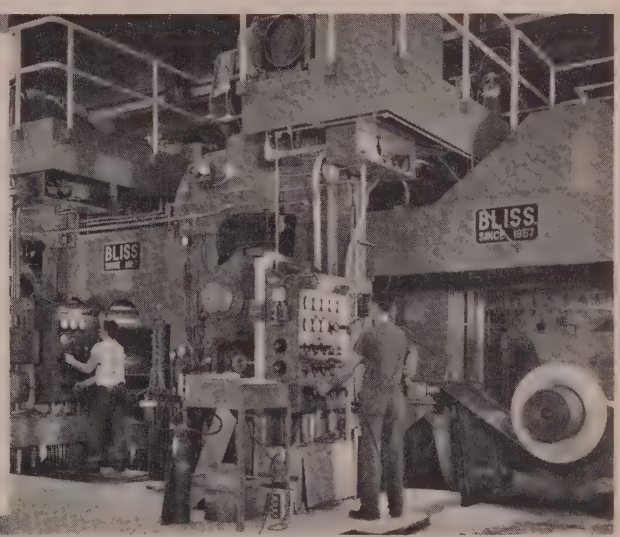


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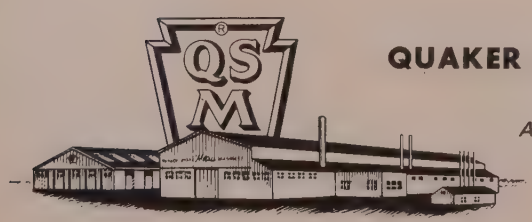


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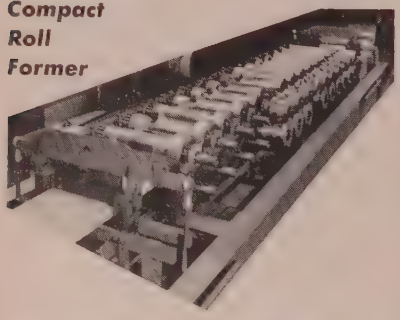

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# News Products and People

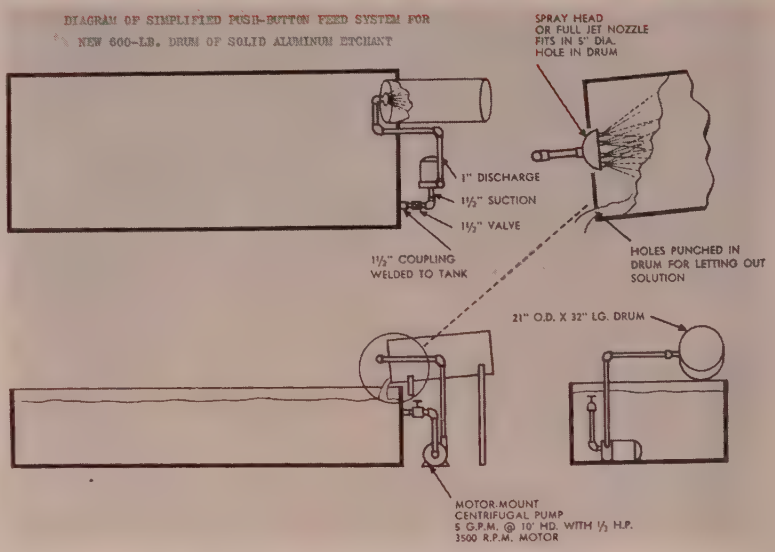
DIAGRAM OF SIMPLIFIED PUSH-BUTTON FEED SYSTEM FOR NEW 600-LB. DRUM OF SOLID ALUMINUM ETCHANT
SPRAY HEAD OR FULL JET NOZZLE FITS IN 5" DIA. HOLE IN DRUM
1" DISCHARGE
1½" SUCTION
1½" VALVE
1½" COUPLING WELDED TO TANK
HOLES PUNCHED IN DRUM FOR LETTING OUT SOLUTION
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MOTOR-MOUNT CENTRIFUGAL PUMP 5 G.P.M. @ 10' HD. WITH ½ H.P. 3500 R.P.M. MOTOR

## Develops Push-Button Feed of Solid Etchant

A new simplified technique for push-button feed of its solid etchant to etching tanks has been developed by Pennsalt Chemicals Corp. At the same time, a 600-pound drum of AE-16S solid etchant was added to the Pennsalt line to serve larger aluminum etching operations. The new large size is in addition to the convenient 90-pound pail in which the solid etchant was introduced last year.

Developed by Pennsalt metal processing technicians, the procedure for more economical and safer utilization of sodium hydroxide etchant is a continuous feed system which requires a minimum of materials. It requires only a pump, standard piping and an ordinary shower head. With the system, aluminum fabricators have exact control of the amount of etchant being added to the tank and can turn the flow of etchant on and off as work loads require.

The 600-pound drum of AE-16S supported by a rack or cradle is positioned with its 5-inch friction lid open over the edge of the etching tank (see drawing). Etchant solution is pumped from the tank through the shower head which directs the spray solution directly on the etchant, dissolving it at a uniform rate.

The concentrated etchant then flows by gravity into the tank through holes punched in the lowest part of the drum head. A 600-pound drum of AE-16S can be readily dissolved and added to the etching tank in approximately 1 to 1½ hours, Pennsalt said.

Etchant in solid form has provided aluminum fabricators with a safer, dustless, and more economical product, Pennsalt claims. It has negligible heat of solution, is easier to handle, and goes into solution without violent action. The new technique for handling large drums of the material offers additional savings, uniform concentration increase, and requires less manual contact than any other etchant handling system, the manufacturer said.

## Protective Coating Approved by Window Association

A new clear, organic coating for aluminum windows gives them long-term protection during and after the construction period, according to the manufacturer, S. C. Johnson Son, Inc., Racine, Wis. However, the company is confident that Perma Cote 61, will perform valuable service for products in many other fields.

Perma Cote 61, a synthetic resin base coating, produces a tough glossy film which is impervious to wet mortar, acid and other construction stains; neither will it discolor when exposed to ultraviolet radiation. The coating has excellent adhesion, Johnson reports, and it can be applied by dip, spray, or brush.

Surface of the aluminum should be thoroughly cleaned or chemically converted, prior to application of the Perma Cote 61, to remove oily residues normally found on aluminum. Chlorinated or aromatic solvents such as toluene, Xylol, carbon tetrachloride, or trichlorethylene can be used to remove the film.

While windows are most likely to be the new product's main market, im-

mediately, it is believed that manufacturers of mobile homes, boats, truck trailers and bodies, and store fronts will have need for Perma Cote 61. Makers of ladders and scaffolds, outboard motors, railway cars, highway signs and outdoor furniture are also expected to offer new markets; even the jet engine industry, provided a suitable pre-cleaner is used.

Johnson reports that Perma Cote 61 is the first coating of its type to meet specifications of FHA and the Aluminum Window Manufacturers Association, and to pass AWMA's 30-day wet mortar test. Top price of Perma Cote 61 is said to be $2.95 a gallon when from one to nine 55-gallon drums are purchased. Coverage is reported to be 1000 to 1500 square feet per gallon of Perma Cote 61.

## Report Growing Use of Super Purity Aluminum

Increasing demand for super purity aluminum is reported by the U. S. Department of Commerce. Consumption is expected to more than double in the next five years.

Domestic consumption of super purity pig and mill products reported in the survey increased from 6 million pounds in 1958 to 6.4 million pounds in 1959, including consumption by producers in converting pig and ingot into mill products.

End use consumption was concentrated in the electronics and petroleum catalyst industries, the survey revealed. Excluding consumption by producers in converting pig and ingot into mill products, the electronics industry accounted for 39% (1.9 million pounds) of the total in 1958 and 57% (2.3 million pounds) in 1959. Catalysts used in petroleum refining consumed 60% (2.9 million pounds) in the 1958 total and dropped to 40% (1.6 million pounds in 1959.)

The total new supply of super purity aluminum in the U. S. increased from 6.8 million pounds in 1958 to 7.5 million pounds in 1959. Imports accounted for 74% of supply in each period, the balance being produced by domestic firms.

U. S. capacity to produce super purity pig and ingot increased from 2.8 million pounds in 1959 to 7.3 million pounds in the third quarter of 1960. This is about 17% of world production capacity, which is estimated at 42 million pounds.

Sixty-two companies contributed survey information. The consolidated estimates by these companies indicate that by 1965 demand would increase to approximately 15 million pounds.

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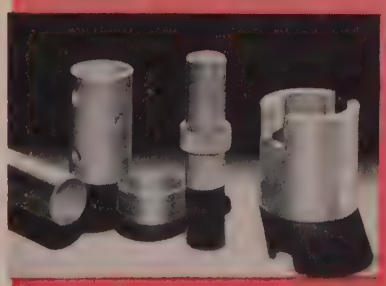

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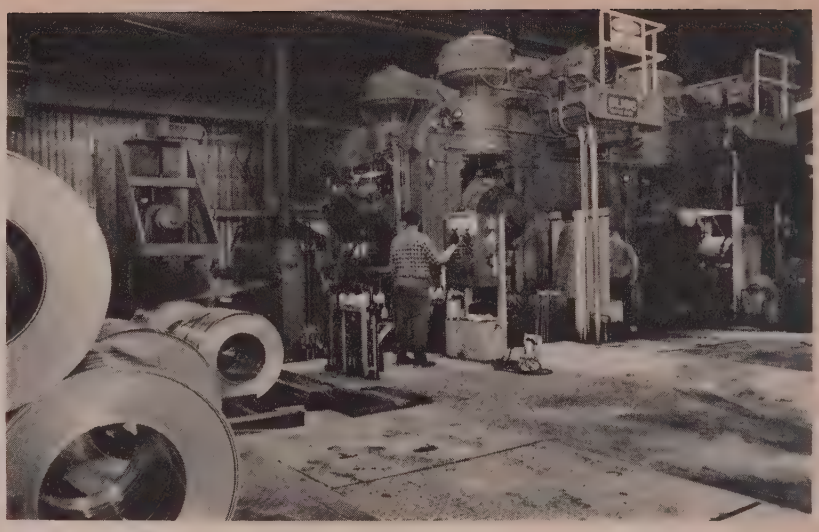


## New Mill Doubles Sheet Roller's Capacity

Following a one-year "breaking in" period, a new tandem mill installed at Quaker State Metals Co., Lancaster, Pa., doubles the plant's cold rolling capacity. The new Bliss mill takes 14-inch aluminum reroll coils and reduces them to .062 inch thickness in a single pass, taking 50% reduction in each stand, at a run-out speed of 1500 feet per minute.

Starting the strip into the first stand is done completely mechanically, beginning with a coil opener equipped with a peeler knife. An automatic edge guide control centers the strip, while entry pinch rolls and a seven-roll bridle unit feeds the strip into the bite of the work rolls, so that no handling is necessary.

Stiffness of the relatively heavy-gage material made the mechanical entry equipment necessary at the Lancaster plant, according to T. F. Zimmerman, vice president of manufacturing. Quaker State is a division of Howe Sound Co., New York.

The mechanical entry equipment and an Askania automatic lateral control were furnished by E. W. Bliss Co., Salem, Ohio.

## Titanium Diboride: New Refractory for Aluminum

Perfection of a process that permits production of titanium diboride shapes of record size and strength has caused Union Carbide Corp. to enter the high temperature refractories industry.

C. A. Odening, director of development for National Carbon Co., Union Carbide's division making and handling the new material, said that titanium diboride had for the past four years been a sort of pilot product with limited application.

"Out of our development work and pilot production have come the techniques that now make possible titanium diboride in sizes and shapes that open up entirely new markets for this high-temperature material," Odening said.

Titanium diboride is said to have excellent resistance to oxidation at temperatures as high as 1000° C., and a relatively low oxidation rate even at 1400° C. It is inert to molten aluminum, molten zinc, and molten slags, but not resistant to molten ferrous metals. These properties suggest titanium diboride crucibles, pumps, tapping spouts, funnel linings, valves and gates for nonferrous metals, especially aluminum.

National Carbon's production techniques result in titanium diboride powder which is very fine, and of high purity, which is then fabricated into various shapes. It's Elecricatl resistivity is the lowest of any ever reported (20 to 30 micro ohm cm at 20° C., and 80 to 100 micro ohm cm at 1000° C.) and is expected to result in one of the first major uses seen for large titanium diboride cylinders as lead-in connections to the cells used in the production of aluminum.

Titanium diboride is one of the few materials not attacked by molten aluminum, or the corrosive salts found in solution. Cathode lead-ins made of the material are being evaluated by the major aluminum producers. Tests to date indicate that the decreased electrical resistance of titanium diboride leads will reduce power losses through the pot lining itself by as much as 30 to 50%, and might permit radically new aluminum cell design. This might reduce the investment per ton of aluminum capacity in new facilities, National Carbon believes.

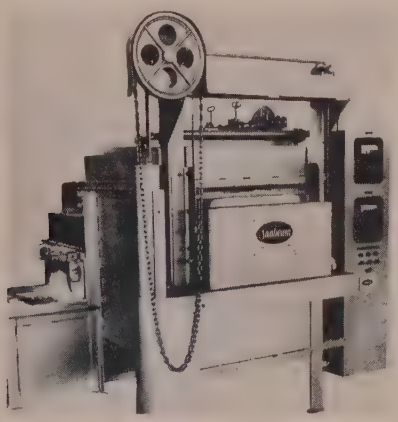
Most high temperature materials begin to weaken seriously above 1500° C., approximately, but the new National

Carbon product maintains a flexural strength of 35,000 psi over the wide range of 25 throught 2000° C, making it the strongest material known at these elevated temperatures.

Titanium diboride's weight is about half that of stainless steel, and only 12% greater than alumina. Because of these properties, one possible use for titanium diboride is as lightweight ball and roller bearings for equipment such as jet and rocket engines that operate at high temperatures.

Its hardness (3300 Kg/mm² Knoop) is in the range of boron carbide, long regarded as the hardest man-made material. This characteristic should lead to its use as milling media — balls, cylinders — or granular abrasives for finishing hard metals. There are many other potential applications.

As of now, cylindrical shapes, 6 inches in diameter and 20 inches long, weighing 100 pounds, and 14 inches in diameter by 10 inches long, weighing 260 pounds, have been produced. These are the largest shapes of this high temperature, high strength material ever made.



## Develop New Dry Hearth Melting, Holding Furnace

A new dry hearth furnace for melting and holding aluminum is being introduced for the first time by Sunbeam Equipment Corp., Meadville, Penn. Designed for use in permanent mold, sand or die casting plants, the furnace can be built for operation with gas, oil or combination fuel.

The furnace features a sloping hearth which quickly melts the aluminum. Porosity causing moisture evaporates on the hearth before the molten aluminum flows rapidly into the holding bath. Precise temperature control in the bath reduces scrap loss.

The furnace is easily adaptable to continuous operations, Sunbeam reports. It may be supplied with end or side dip out wells to fit any floor space requirements.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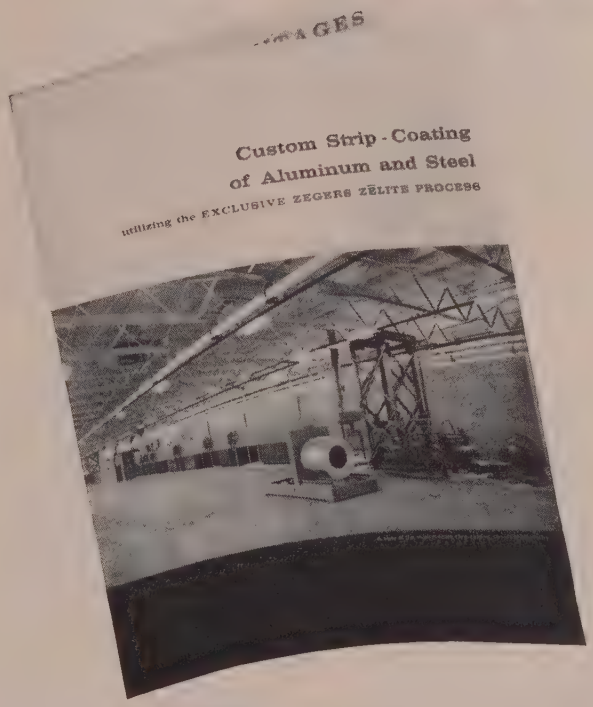


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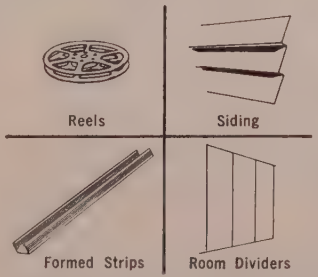


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## New Baked Enamel Developed for Aluminum Siding

A one-coat enamel for use on building siding, made of thermosetting acrylic resins, is a new development of Pittsburgh Plate Glass Co., Pittsburgh 22, Pa. The baked finish affords longer life than any other single-coat organic baked film designed for siding use, PPG claims.

The chemical coating protects siding against chipping, cracking, flaking, peeling or blistering and insures a sparkling, durable finish for aluminum siding, the manufacturer said.

"Extensive field tests proved the coating will last for years in corrosive salt air and industrial fumes," a PPG spokesman reported. "Under normal conditions the hard, smooth aluminum siding finish can be maintained simply by hosing down the surface periodically."

The company pointed out that while other organic coatings are recognized as being excellent in one or two specific properties, its Duracron finish combines in a single coating qualities of adhesion, flexibility, chemical resistance, durability, color detention, and ease and uniformity of application.

PPG said that while other acrylic finishes have limited use because of a tendency to retain solubility and thermo-plasticity even after baking, the Duracron coatings become extremely hard, insoluble and infusible after baking, without sacrificing the advantages of acrylics.


AMERICAN ROLLER DIE CORP.
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**PRODUCTION EQUIPMENT**

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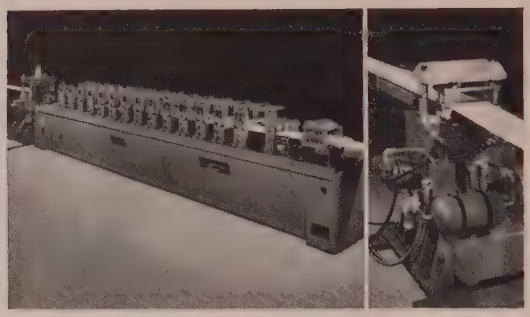
# ALUMINUM SIDING



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## New Racks Mean Added Versatility for Trailers

New interlocking aluminum panels which allow operators to quickly and easily convert their platform trailers to open top units in less than an hour, have been introduced by Fruehauf Trailer Co. Detroit.

Interchangeable between their steel, lightweight steel, and aluminum platform trailers, Fruehauf says the panels are fitted together with interlocking extrusions to give proper stability for open top operation. Each panel, which can be removed without disturbing the adjoining rack, is equipped with a lifting bar on the outside and hand clasps on the inside for easy handling by one man without special equipment.

The top of each rack has provision for 2 steel tarp bows set on 24-inch centers. The bows are shaped to curve and enter the racks in a vertical position which the company says keeps the tarp from rubbing against the top edges of the panels. At the bottom of each panel are 2 steel stake inserts that fit snugly into the standardized pockets of all Fruehauf platforms. When not in use, panels and tarp bows are housed in the front of the vehicle.

To close off the cargo area in the rear, Fruehauf uses plymetal doors with a full height cam locking engagement operated from the ground, and an integral split header, that gives the doors rigidity when locked. These doors can be either lifted off or swung back flush against the side panels of the trailer.

## Improved Surface, Strength Offered by Extrusion Ingots

Three ingot compositions of aluminum extrusion alloy 6063—6063, S6063 and T6063—can be obtained from Reynolds Metals Co. to suit various extrusion needs.

Alloy 6063 is a heat treatable, precipitation hardening alloy suitable for extruding any of the usual tempers such as T4, T5 and T6. Reynolds recommends it for a wide range of sections in any of the preceding tempers and for use when the extruder does not have enough variation in production re-

quirements to justify an inventory of two types of ingot.

Reynolds recommends S6063 for production of either T42 or T5 temper extrusions. It is intended to give improved surface and to extrude at higher speeds. It is limited, however, to extrusion of hollow sections or thin solid sections with a high extrusion ratio, and is not recommended when mechanical properties of T4 and T6 tempers are required.

Ingot T6063 is recommended when maximum strength and hardness are desired. To obtain the higher strength, however, some degree of extrudability and surface finish must be sacrificed.

## Dow Die Casting Plant At Bay City Being Closed

The closing of its die casting department in Bay City, Mich., has been announced by the Dow Metal Products Co., Midland, Mich.

A company spokesman said the operations of the plant will be phased out during the next few months. Present customers will be assisted in locating new sources of magnesium and aluminum die castings during this period.

Dow said it has taken this action to eliminate itself from competition with other die casters who are its customers for magnesium die casting ingot. Also, because a new customer service laboratory for die casters is to be opened in January, in Midland, which will handle development and pilot plant work previously done at Bay City.

The department has about 55 employees, most of whom will be absorbed by other Dow operations. The foundry and fabrication department of the Bay City plant are not affected by this move.

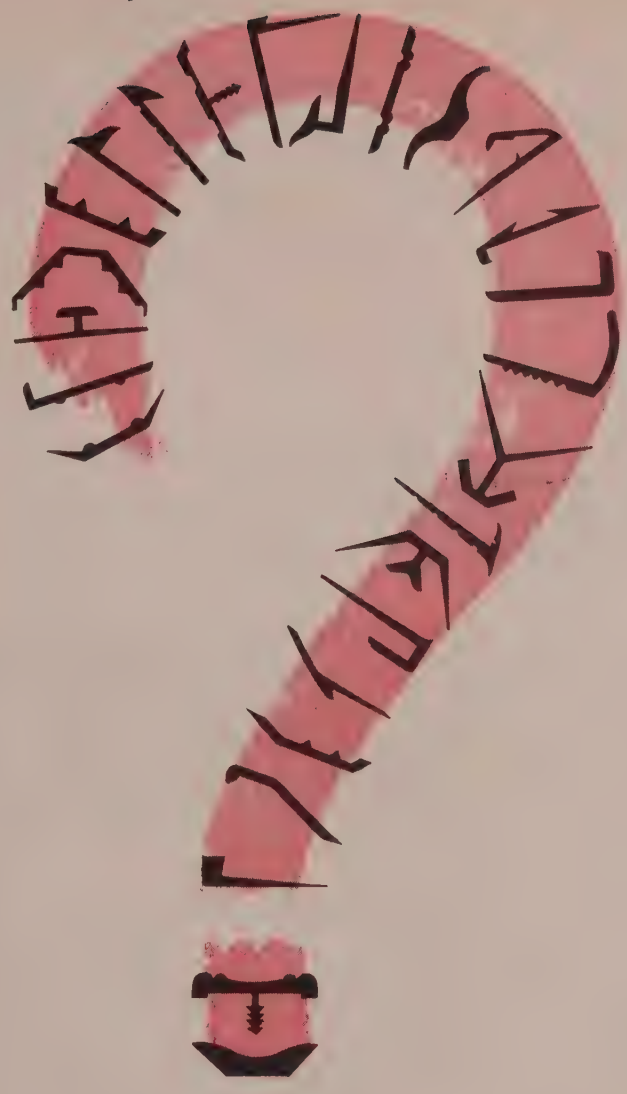
## Kaiser Expands Chalmette Extrusion Billet Capacity

A major expansion of facilities to produce extrusion billet is underway at Kaiser Aluminum & Chemical Corp.'s Chalmette, La., primary reduction plant.

The expansion will increase the plant's capacity for casting high-quality billet by approximately 50%. The project is expected to be completed during 1961 at a cost of about $2 million.

Included will be holding and charging furnaces, a high-capacity direct-chill casting unit, and accessory equipment. The completed facility will be housed in a 30,000 square foot building under construction.

The new equipment, designed to produce Kaiser Aluminum's 6063 billet products, will be able to cast extrusion billet ranging in diameter from 3½ to 12 inches and in lengths up to 220 inches. The equipment also will direct-chill cast square billet for further processing into electrical conductor products.

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## Hupp Acquires Maker of Architectural Shapes, Boats

Hupp Corp., Cleveland, Ohio, household appliances manufacturer, has contracted to purchase assets and business of Flour City Ornamental Iron Co., Minneapolis. Flour City designs and fabricates architectural metal work and produces the Aluma Craft lines of small aluminum and fiberglass pleasure boats.

Under terms of the contract, Hupp will issue 339,509 shares of Hupp common stock, to be distributed to Flour City shareholders on the basis of .85 Hupp shares for each Flour City common share outstanding.

Flour City's sales for the year ended Sept. 30, 1960 were approximately $10 million. Net worth on Sept. 30 was approximately $4.8 million.

Hupp Corporation reported sales of $56.3 million in the nine months ended Sept. 30, 1960, and net worth of approximately $27.5 million. Hupp is engaged primarily in air conditioning, refrigeration, household appliances and heating. It also manufactures aviation-missile, automotive and hydraulic products, operating ten plants in nine states and Canada.

The acquisition will be operated as a subsidiary of Hupp Corporation under present management.

Flour City presently occupies three plants in Minneapolis with about 375,000 square feet of manufacturing space and 650 employees. Use of Hupp plants in locations close to major boating markets for expansion of boat building operations on a regional basis is under study.

The firm also designs and fabricates aluminum, bronze, steel and stainless steel curtain walls, windows, doors, stairs, electric stairway balustrades and similar products for commercial and monumental governmental buildings.

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## Aluminum Fosters Over-the-Road "Trains"

New side-unloading aluminum dump trucks and wagon trailers built by the Differential Co. Findlay, Ohio, now permit multiple trailer units to carry higher over-the-road payloads at lower costs.

Called "wagon trains," each 8-foot wide by 14-foot long trailer is capable of carrying 10 cubic yards of material and may be attached in tandem to a dump truck. The truck also carries a 10 cubic yard dump unit.

Each wagon unit weighs 5,000 pounds empty and utilizes 3,600 pounds of high strength 5086 alloy aluminum sheet and plate for door panels, front and rear panels, floor plates, and walking beams. Structural channels are 6061-T6 alloy aluminum extrusions. MIG welding, with 5356 alloy filler wire, was used to join 1/2 inch floor plates to main frame and to rear and front panels. Beams and channels are welded to wedge shaped doors and ends for added strength. Aluminum alloys, supplied by Kaiser Aluminum have high strength, excellent shock absorption at one-third the weight of steel. Aluminum spoke

wheels are also used to further reduce over-all weight.

Fred Flowers, president of Differential, stated: "Wagon train payload ratios to the tare weight are probably the highest offered for any dump trailer. This results largely from the use of aluminum and also the design which locates the wheels directly under the load. In addition, our design eliminates the need for long heavy frames, goosenecks, and fifth wheel construction."

## Solder Produces Strong, Non-Corrosive Joints

A solder requiring no flux when used on aluminum or magnesium, and which is claimed to have a tensile strength of up to 26,880 psi, is being distributed in this country by Production Metals Inc., 299 Pavonia Ave., Jersey City 2, N. J.

Aubrey L. Moss, president of the firm, says the solder — Tin-A-Lum — can join almost any metal, with the exception of black or cast iron. Aluminum applications have included soldering bus bodies, prefabricating downspouts and gutters, and appliance manufacturing.

Tin-A-Lum can be applied with an ordinary soldering iron at 410°F. It is said to flow readily and penetrate surface layers of work easily so that in many instances soldering can replace welding.

Moss also claims that Tin-A-Lum soldered products can be rolled, pressed or molded to almost any shape, can take a high polish and can be chromium plated. Because of its high conductivity, Moss recommends the use of the solder on power lines, cables, etc.

The solder has been used in South Africa for over a year, and the South African Bureau of Standards, Pretoria, has conducted tensile and corrosion tests on the material.

Tensile strength was determined to be 20,100 psi after three tests on butt welded joints. Joined were hexagonal sections of 2017 T4 aluminum measuring ¾ inch across flats, hexagonal sections of 2024 T4 aluminum measuring ⅝ inch across flats, and ½-inch alloys 2011 T3 rod.

To test the corrosion resistance of the solder, a lap joint was exposed for 48 hours to a spray of 5% sodium chloride (salt) solution. According to the laboratory, "the joint showed less corrosion after the test than the parent metal."

Moss says other data are available, but the best test is for interested persons to try the solder on their own products and repair jobs. For this trial, anyone can get free samples by writing Production Metals.


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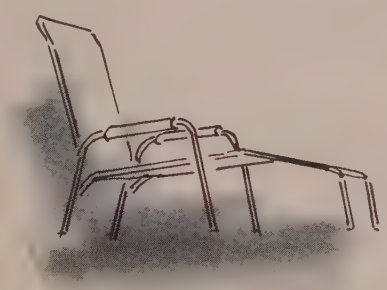
**on Aluminum, Magnesium and Zinc-plated parts**



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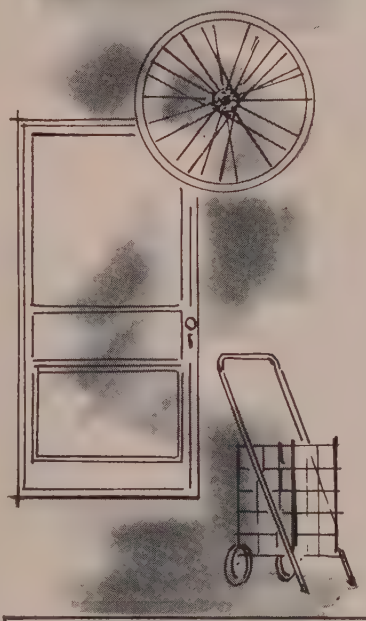
CLEAR PROTECTIVE COATINGS



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**ON MAGNESIUM**—Irilac over Iridite 15 increases protection, resists damage from handling or abrasion. Color range—light to dark brown.

**ON ZINC**—Iridite plus Irilac gives longer product life, brighter appearance. Color range—clear Iridite to olive drab, plus colored dyes.

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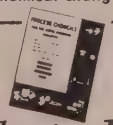
**IRILAC**—Clear protective coatings for all metals. Safe and easy to handle as water. Apply by dip or brush. No exhaust or special fire prevention equipment required. Adds protection and abrasion resistance to base metals, plated parts or parts treated with electrolytic or chemical post treatments without chemical change.

**For complete technical information on IRIDITE or IRILAC coatings, write for FREE TECHNICAL MANUAL. Or, see your Allied Engineer. He's listed under "Plating Supplies" in the yellow pages.**



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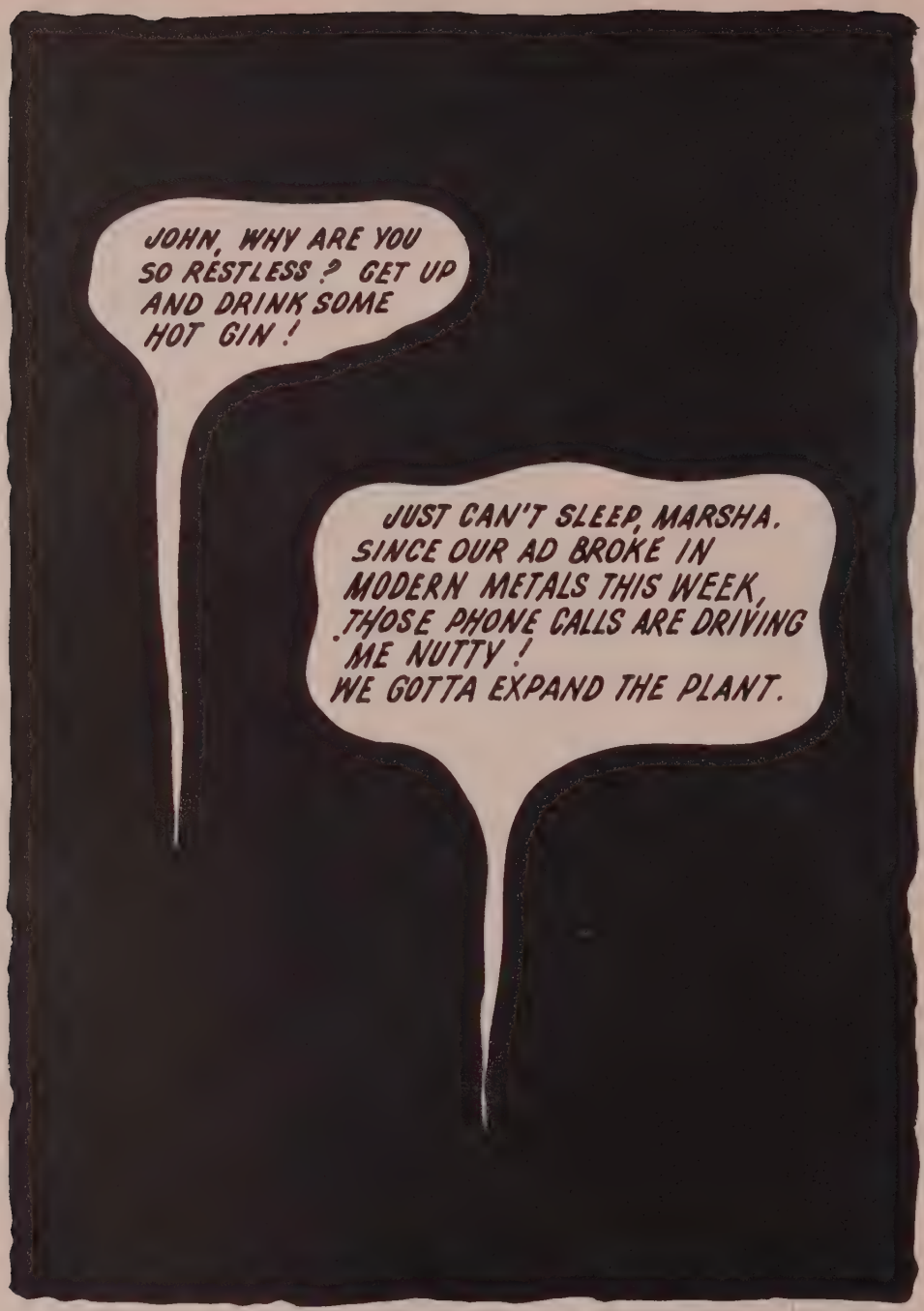
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## 60-Cycle Induction Heater Anneals Aluminum Blanks

A 60-cycle induction heater for annealing aluminum circular, rectangular, oval or other shapes is being distributed by Ajax Magnethermic Corp., Youngstown, Ohio. Blanks ranging from 4 to 30 inches in diameter can be annealed by using the appropriate sized coil.

The unit heats the blanks in 12 inch stacks, and thickness of material can range from 1/32 on up to whatever thickness is required. Heat times range from a minute per stack in the smallest diameter to 40 minutes maximum for the 30 inch diameter.

To anneal, the operator stacks blanks on a conveyor, positions them under the heating coil and presses the start button. Automatically the positioning guides retract, the stack is hoisted into the coil, which is energized for a pre-timed cycle.

When blanks are up to temperature the coil is de-energized and the stack is automatically returned to the conveyor. The annealed stack is moved to the cooling conveyor while another stack is loaded.

A typical unit can heat 1000 pounds per hour to 850°F, and is rated at 125 KW. Power is 440 volt, 1 phase, 60-cycle.

Because only one stack is in process at a time the operation can be started or stopped at will. Temperature changes can be made by turning a dial.

After cooling, the stacks need only be wrapped for shipment. One man can easily operate two adjacent units.

## Men-on-the-move

**Ken C. Tucker,** formerly manager of the food industries division of Oakite Products Inc., New York, has been appointed assistant sales manager of the firm. Responsibilities of his new post include servicing national accounts.

**Dr. Arthur F. Earle** was elected vice president and secretary of Aluminium Limited Sales, Inc., New York, at a recent meeting of the board of directors.

Wolverine Tube, Division of Calumet and Hecla, Allen Park, Mich., has appointed two new plant managers. **E. C. Walter** has been named to that position at the recently modernized Detroit plant, while **V. A. Zatell** manages the division's new special metals plant in Inkster, Mich.

**A. Joe Snider,** former Cleveland district sales manager of Fairmont Aluminum Co., Fairmont, W. Va., has been named assistant to **W. Bradley Blair,** vice president of sales for the firm. Fairmont has also appointed **Paul E. Jones** manager of its Chicago district.

## Extruded Pilasters Replace Complicated Steel Units

Another product fabricated by joining numerous steel components has succumbed to the efficiency of the aluminum extrusion. The switch has been made by General Welding and Fabricating Co., Erie, Pa., manufacturer of toilet partitions.

Pilasters formerly used in erecting the partitions were made of four steel pieces. Each unit was 2 by 4 inches by 7 feet long, so construction required four 7-foot welds per pilaster (at right, in photo). After welding, the entire pilaster had to be hand ground to prepare the surface for painting.

General Welding decided that steel pilaster production cost was too high—mainly because of the manual processes involved. Elimination of hand welding and grinding was the problem. The aluminum extrusion was the solution.

Superior Industries Inc., Youngstown, Ohio, was contacted to design the proper shape. Superior now extrudes pilasters (at left) from 6063 T5 aluminum, and has them anodized. By coupling extruding with anodizing, the welding and grinding were eliminated.

The new method offers General Welding many other advantages, says the firm. Pieces arrive at the Erie plant ready for painting and partition assembly, reducing material handling greatly. Also, there is no need for a stock of small steel pieces. The final product also gains an advantage in that there are no crevices or seams.

General Welding has switched to extrusions for other products; now buys eight different shapes from Superior.


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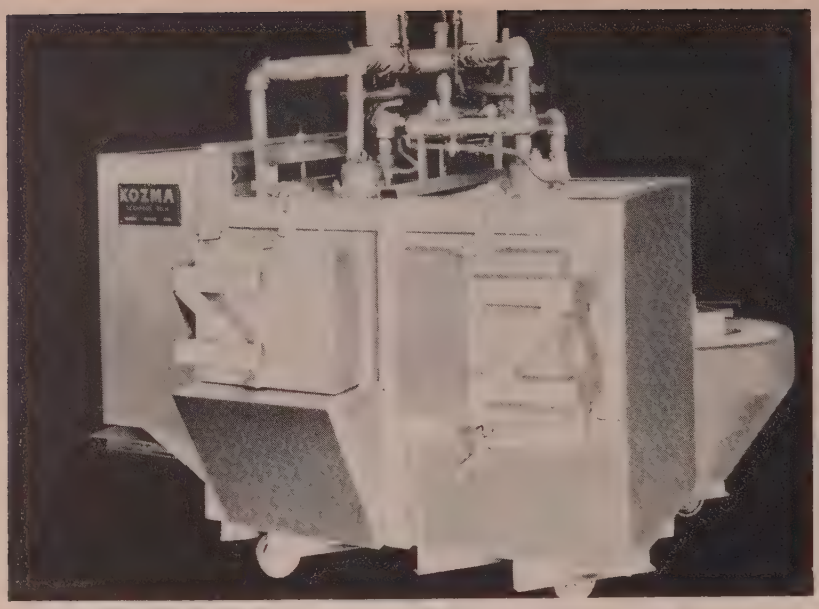


## Radiant-Fired Melting Furnace Holds 300 Pounds

A new aluminum melting furnace, Type RSHCH, especially designed for use with aluminum die casting machines is announced by the J. A. Kozma Co., 2471 Wyoming, Dearborn, Mich. Pictured: Model 300 (300 pounds per hour).

The new furnace is ideally suited to the production of low porosity aluminum castings, according to Kozma. The exclusive Kozma "Pre-Temp" charging and sub-surface metal flow principles of design virtually eliminate hydrogen pick-up and oxide inclusions, keeping metal at an extremely high purity level.

The high purity is said to be attained by the "Pre-Temp" charging knee with its carefully engineered position angle. This prevents the aluminum ingot from entering the bath until it has reached a plastic state. Pre-heating of the ingot is approximately 70% of the melting point at which heat the ingot deforms and is allowed to slide into the bath with virtually no increase in surface area. Several other sizes are available, up to 5000 pounds.


no matter what the two metals are . . .

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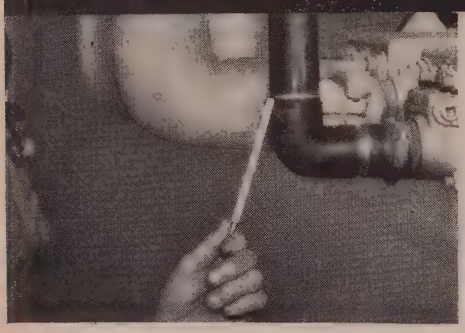

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| 400°F-500°F | | | | | | | 700°F-800°F | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Al. | Copper | Brass | Steel | S.S. | Nickel | | Al. | Copper | Brass | Steel | S.S. | Nickel |
| 37 | 107 | 107 | 107 | 107 | 107 | Aluminum | 56 | 105 | 105 | 105 | 105 | 105 |
| 107 | 430 | 430 | 430 | 430 | 430 | Copper | 105 | 105 | 105 | 105 | 105 | 105 |
| 107 | 430 | 430 | 430 | 430 | 430 | Brass | 105 | 105 | 105 | 105 | 105 | 105 |
| 107 | 430 | 430 | 430 | 430 | 430 | Steel | 105 | 105 | 105 | 105 | 105 | 105 |
| 107 | 430 | 430 | 430 | 430 | 430 | Stain. Steel | 105 | 105 | 105 | 105 | 105 | 105 |
| 107 | 430 | 430 | 430 | 430 | 430 | Nickel | 105 | 105 | 105 | 105 | 105 | 105 |

Reference numbers above indicate All-State solder to be used for joining metals.

A set of four complete tables, covering temperature ranges from 400F to 800F, is yours for the asking. Send for free Instruction Manual, too.

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## Plan New Aluminum Complex in Australia, New Zealand

Kaiser Aluminum is joining forces with Consolidated Zinc Corp., Ltd., a veteran member of the Australian metals industry, in the development of an integrated aluminum complex in Australia and New Zealand. Announcement of the partnership followed hard on the heels of the report (MM, Nov., page 103) that Consolidated Zinc and British Aluminium Co., a Reynolds Metals Co. interest, were dissolving their partnership in the same kind of venture.

The companies will be equal partners in the development of vast bauxite mining reserves and hydro-electric power. The effort should result in the largest integrated aluminum facilities in the southern hemisphere.

"The new facilities will be ideally situated to serve world markets, particularly those rapidly developing in the Pacific area," said D. A. Rhoades, president of Kaiser. "We believe consumption will more than double in this area by 1970."

Kaiser Aluminum plans to invest more than $10 million in properties presently held by Consolidated Zinc and will participate equally with Consolidated Zinc in construction of additional facilities during the next six years. Major projects planned are:

1. Development of bauxite mining reserves in the Weipa area of Cape York peninsula, Australia, and construction of a 360,000 long ton alumina refinery there.

2. Expansion of the Bell Bay, Tasmania, aluminum reduction works from 12,000 long tons per year of primary aluminum capacity to at least 28,000 long tons.

3. Development of a hydroelectric power source using the waters of Lakes Te Anau and Manapouri in New Zealand. The generating system will have an energy rating of 280,000 KW initially and is designed for enlargement.

4. Construction of a new aluminum reduction works at Bluff, New Zealand, near Invercargill. This works will have capacity to produce 120,000 long tons of primary aluminum annually using Manapouri power and Weipa alumina.

5. The establishment of fabricating facilities.

Consolidated Zinc brings to the new

venture concessions to bauxite reserves on Cape York, concessions to hydro power sites in New Zealand, and options on coal reserves in Queensland, Australia. In addition Consolidated Zinc recently presented a proposal to the Australian government for the purchase of two-thirds interest in Australia's only aluminum reduction plant at Bell Bay.

## Aluminum Dropped Ceiling Goes Up Quickly, Easily

Installation economies are claimed for a new aluminum suspended ceiling system, which has been introduced by Cupples Products Division, Aluminum Co. of America. A residential version of Cupples' Alumi-Coustic commercial ceiling is now available through Montgomery Ward and Company. The new lightweight aluminum grid, combined with accoustical and luminous ceiling panels, promises to find wide use in the finishing of kitchens, baths, living rooms, gamerooms and dens.

An outstanding advantage of the system is its simplicity of installation. The aluminum components go up quickly and easily with just a few ordinary carpenters' tools and a special locking wrench included with the system, according to Cupples.

It is assembled from interlocking "tee" members on a two foot by two foot, or two foot by four foot, module. Unique tabs on the ends of the intersecting tees are "locked" into place with the special tool to assure rapid assembly and high joint strength.

A perforated hanging strap suspends the aluminum grid from any existing ceiling, or joists. Panels are then dropped into the modules to complete the project. Provision for light fixtures are also designed into the system.

Panel types currently available for the ceiling grid include accoustical, an egg crate design, peg board, and translucent.

## Fairmont Expansion Will Be Completed in Early '61

The $10 million expansion program at the Fairmont Aluminum Co. rolling mill in Fairmont, W. Va., is proceeding on schedule, according to President Robert T. Farrell, who said that he expects the new facility to be in operation sometime in the spring of 1961.

A subsidiary of Cerro de Pasco Corp., New York, Fairmont will have one of the largest plants of its type in the U. S. when the addition is completed. Farrell said that the existing mill also is undergoing extensive modernization as part of the 10-million dollar program.

The Fairmont expansion, designed to increase coil and sheet aluminum production nearly 150%, will give the plant a yearly capacity of 66 million pounds of aluminum, as compared with the present 25 million pounds.

Of equal importance, Farrell explained, was the fact that the multi-million dollar expansion and modernization program will permit Fairmont to increase the width of its sheet by 100% — from the present 36-inch maximum width to 72 inches. Additionally, the facility will be able to produce aluminum sheet in heavier and lighter gauges, ranging downward from ⅛ inch thick to .006 inch in a wider range of alloys than heretofore.

Farrell said that the increased width and expanded gauge-range will open to Fairmont big, new sales areas — a vital need if the company is to improve its competitive position. He said there is an industry trend toward the use of wider aluminum coil and sheet.

Some of the markets, which Fairmont already supplies, include building products manufacturers; cooking utensil and home appliance producers and automotive parts makers.

The firm is now laying the groundwork for an enlarged and re-aligned sales force. It will be an aggressive sales team, Farrell said, which will actively seek new business in the construction industry, the mobile-home field, boat building, and industrial transportation.

In line with the enlarged sales force, Farrell said that new sales offices have been added in key markets, and warehouses established across the country.


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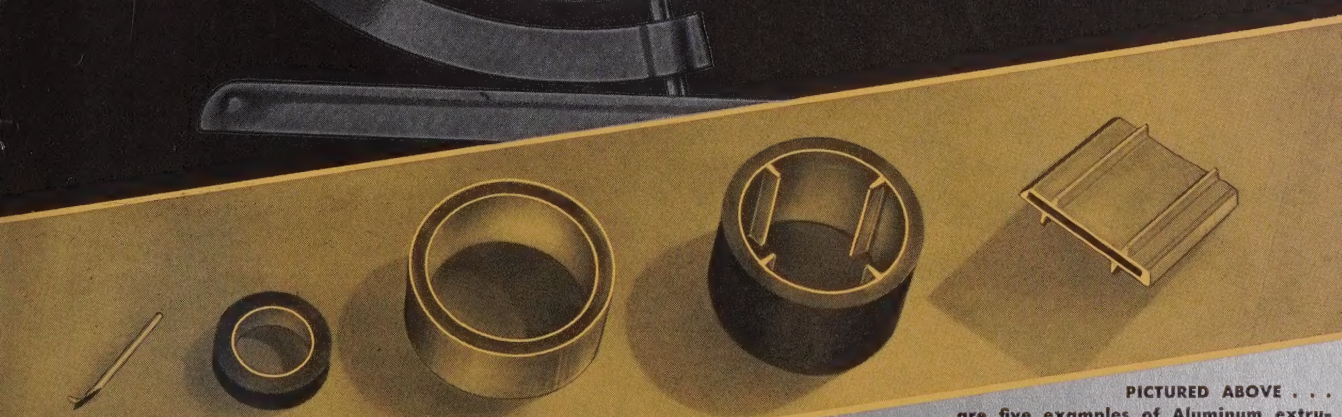
*A 63S Alloy aluminum extrusion, actual size, extruded on a 14-mandrel die. Samples of this extrusion on request*



**PICTURED ABOVE . . . are five examples of Aluminum extrusion cladding, indicating some of the advancements in the extrusion process engineered and designed by MOCZIK.**

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# Looking Ahead

**Aluminum prices firming?** One big extruder has established a price floor; refuses to sell at a lower price just to get or keep business. This was the talk at recent extruders meeting, and some extrusion users admit they're now paying more for shapes. Could it be that the leading price-cutters are getting religion? Another straw in wind: Several upticks in ordering pattern for January. Maybe the only direction the economy can go is up in 1961.

**The steel industry** has had a pretty fair year after all. As pointed out by J. L. Block, of Inland Steel, the 100 million tons of ingot to be produced in 1960 will exceed by 3% the annual average of 97 million tons produced in 1957, '58 and '59. Block thinks inventory liquidation "will come to an end very early in 1961." Steel users will then start ordering; steel operating rate will perk up.

**European market for U.S. aluminum** should remain strong next year as rising standard of living pushes the Continent's per capita use of aluminum closer to the 20.5 pound-per-person rate in the U.S. Use of aluminum in Europe reached a 730,000-ton annual rate – a 34% gain over last year. Producers on the Continent are rushing their expansion schemes, but show no sign of keeping pace with demand. Biggest bullish factor: Use of aluminum in building is far below U.S. average; seems certain to jump as Europeans adopt American methods and applications.

**Ford is grooming** a new generation of aluminum engines for 1962 models. Talk is that Ford is developing an aluminum V-8 for a new model, bigger than the Falcon. Chevrolet, not to be out-maneuvered, has its own crash program to create 4- and 6-cylinder aluminum engines.

**Aluminum distributors are concerned** about commodity prices in aluminum; recently called for a re-examination of existing products being offered this way. These firms, which sell more than 16% of all aluminum mill products, complain that the plan has gone far beyond its original intent; prevents distributors from participating in logical markets for sheet, coil, plate, rod, bar and wire; and has cut price schedules beyond already slim profit margins. Distributors also complained about imports; suggested plans to curtail them.

**Titanium is one bright spot** in the metals picture. Production and shipments of mill products reached 963,908 pounds in August – better than triple the amount shipped in August '59. The January-August total of almost 5.8 million pounds is 28% over the amount of titanium shipped in the same period last year, and 71% better than the January-August total of two years ago. We hear that 15% of the titanium is used in missiles, 2% in chemical equipment, and the rest in aircraft. Jets are said to be using 15% more this year than last. Trend to increased use of titanium should continue into 1961. Example: There's talk that the B-70 supersonic bomber, now 85% stainless steel, may be redesigned to use more titanium.

**Aluminum siding for homes** is enjoying its biggest year despite a 30% drop in housing starts – but recently went through the price wringer. Early last month, siding was increased $1 a square by some producers. Then, on November 9th, the price was cut by the same amount to $22.95 a square. Some say the increase was made to keep some major distributors interested; that the subsequent cut was made to drive them out. Whatever the reason, talk is that three of the big building product distributors are disenchanted with aluminum siding; ready to drop it. Meanwhile, independent siding manufacturers are completing their biggest year; look for a substantial sales jump in 1961. Details will be reported in our January issue.

**Good place to look for new users** of aluminum in the U. S. is among the 5500 sheet metal shops, the 4000 welding plants, and the 3000 architectural and ornamental fabricators. These 12,500 firms have been neglected mainly because they use small amounts of aluminum. Three years ago only 2000 or so used aluminum. Today it's double that amount, and we find them an interested group of new subscribers. They are buying better equipment, hiring technicians and salesmen, and going after precision fabrication work. We estimate that nearly 4000 of these plants now consume 40-50,000 tons of aluminum annually. Some intelligent promotion could easily sell 150,000 tons to these plants annually within a couple of years.

**Down in Australia,** there's talk of expanding that country's only primary plant (at Bell Bay) from 11,000 tons to 16,000 tons annually by 1962. But with consumption moving at a 27,000-ton annual clip, the folks "down under" will probably depend on foreign suppliers (mainly Canada) for many years to come. Talk of Australia becoming a net exporter of primary aluminum sounds extremely optimistic at this time.

**Russia, apparently,** needs all the aluminum it can make. Shipments of Soviet aluminum to the United Kingdom were at a 4000-ton annual rate for the first six months of '60 – and most of it was shipped in to fulfill contracts made a year or more ago. Last year the Russians shipped 15,600 tons of aluminum to the U. K. We hear talk that plans are underway to boost Soviet Bloc output 150% by 1965 (compared with 1959), but details are scarce.

*– The Editors*

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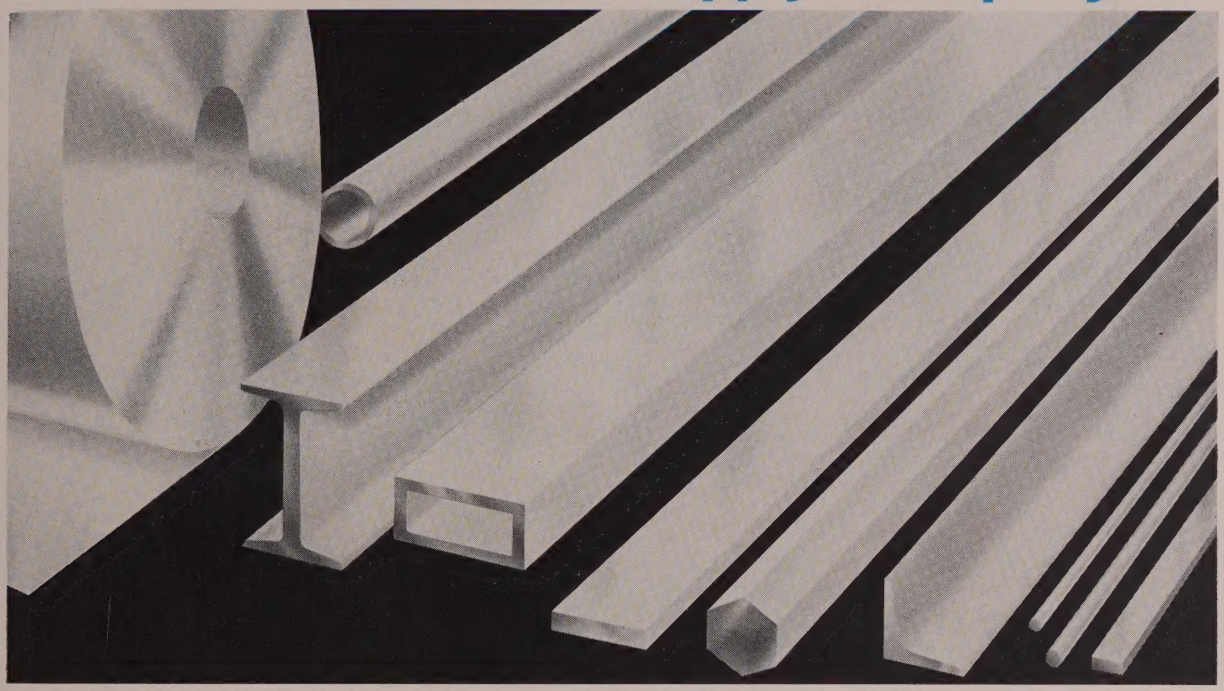

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